Dissertation

"COMPARATIVE STUDY ON OUTCOME OF VARIOUS SURGICAL PROCEDURES IN PILONIDAL SINUS"

M.S. BRANCH - I

GENERAL SURGERY

MADRAS MEDICAL COLLEGE
THE TAMILNADU
Dr. MGR MEDICAL UNIVERSITY
CHENNAI – TAMILNADU

APRIL 2015

CERTIFICATE

This is to certify that, the dissertation entitled **"COMPARATIVE STUDY ON OUTCOME OF VARIOUS SURGICAL PROCEDURES IN PILONIDAL SINUS"** is the bonafide work done by **Dr. BHARATHIDHASAN. V** during his MS (General Surgery) course 2012-2015, done under my supervision and is submitted in partial fulfillment for the requirement of the M.S.(BRANCH-I)- General Surgery, April 2015 examination of The Tamilnadu Dr.MGR Medical University.

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DECLARATION

I, declare that this dissertation titled **"COMPARATIVE STUDY ON OUTCOME OF VARIOUS SURGICAL PROCEDURES IN PILONIDAL SINUS"** represents a genuine work of mine. The contributions of any supervisors to the research are consistent with normal supervisory practice, and are acknowledged.

I also affirm that this bonafide work or part of this work was not submitted by me or any others for any award, degree or diploma to any other University board, either in India or abroad. This is submitted to The TamilNadu Dr. M.G.R Medical University, Chennai in partial fulfillment of the rules and regulations for the award of Master of Surgery Degree Branch I (General Surgery).

Date:

Place: **Dr. BHARATHIDHASAN. V**

ACKNOWLEDGEMENT

As I walk down the memory lane, I realize with a deep sense of humility that what I have done now would not have been possible, but for certain luminaries, who have enlightened my path to wisdom.

"Surgery is learnt by apprenticeship and not from textbooks, not even from one profusely illustrated" – Ian Aird.

While I put these words together it is my special privilege and great pleasure to record my deep sense of gratitude to my revered Professor and Guide **Prof. T. Bavanisankar, M.S.,** and **Prof. A. Affee Asma. M.S.,** but for whose constant guidance, help and encouragement this research work would not have been made possible. The unflinching academic, moral and psychological support will remain ever fresh in my memory for years to come. Words cannot simply express my gratitude to them for imparting to me the surgical skills that I have acquired.

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My heartfelt thanks to the entire Institute of Biochemistry for granting me permission and helping me to conduct this study.

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I thank the Dean, MMC & RGGGH for permitting me to conduct this study.

I would be failing in my duty if I do not show my deep sense of gratitude to all the patients who had helped me to become a surgeon and especially those who consented to be part of this study.

With deep reverence, I salute my parents and I thank the Almighty for blessing me with a wonderful family to whom I have dedicated this thesis and leave unsaid what they mean to me.

ABSTRACT

Background

Pilonidal disease is a condition affecting the young. It is disease that have high rates of morbidity unless properly identified and treated.

Objectives

This study intends to know the incidence, aetio-pathogenesis, clinical presentation and management of pilonidal disease with relevance to flap procedure and prevention of complications and recurrence

Methods

This is a prospective study which includes 50 patients who were admitted to our hospital, who met with inclusion and exclusion criteria were subjected to detailed clinical examination and investigations. Depending upon the site of incompetence and the magnitude of disease, the treatment is carried out. All the results are evaluated and analyzed by comparing with other standard results.

Results

In this study, there was a male preponderance noted to be about 5:1. Mean age at presentation is noted to be in the range of 29.48±5.12years. The disease was noted to be more common in persons who have work pertaining to long duration of sitting. Clinical presentations varied from chronic painful discharging sinuses with acute presentations of pilonidal abscess. Almost 45% of the patients of this study had previous pat interventions for the

similar complaints all the patients who presented had a deep natal cleft and no radiological abnormalities noted on x ray.60% of the patients who presented had a high body mass index. The organisms cultured from the discharge are mostly anaerobic in nature. The most common treatments that the patients underwent were incision and drainage for abscesses and wide excision with healing by secondary intention, marsupialization and Limberg flap. The complications noted are wound infection. wound dehiscence and collection. The recurrence rates for the individual treatments have been studied and noted. The duration of hospital stay and time taken for complete healing of the would is noted to be lowest in the Limberg flap procedure.

Conclusion

This study shows that pilonidal disease affects the young with a male preponderance. Occupation and local anatomical factors play an important role in the pathogenesis of the disease. The diagnosis of pilonidal disease is essentially clinical. There are a variety of treatment options available for the management of pilonidal disease. But the most effective is the Limberg flap procedure as it has low rates or recurrence and faster healing rates.

Key words

Pilonidal Disease, Natal Cleft, Pain, Sinus, Discharge, Abscess, Incision and Drainage, Marsupialization, Limberg Flap, Complications, Recurrence, Duration of Hospital Stay

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CERTIFICATE OF APPROVAL

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Chennai – 600003.

Dear Dr. V. Bharathidhasan,

The Institutional Ethics Committee has considered your request and approved extension of the study titled **"Comparative study on outcome of various surgical procedures in pilonidal sinus"** No. 01062014.

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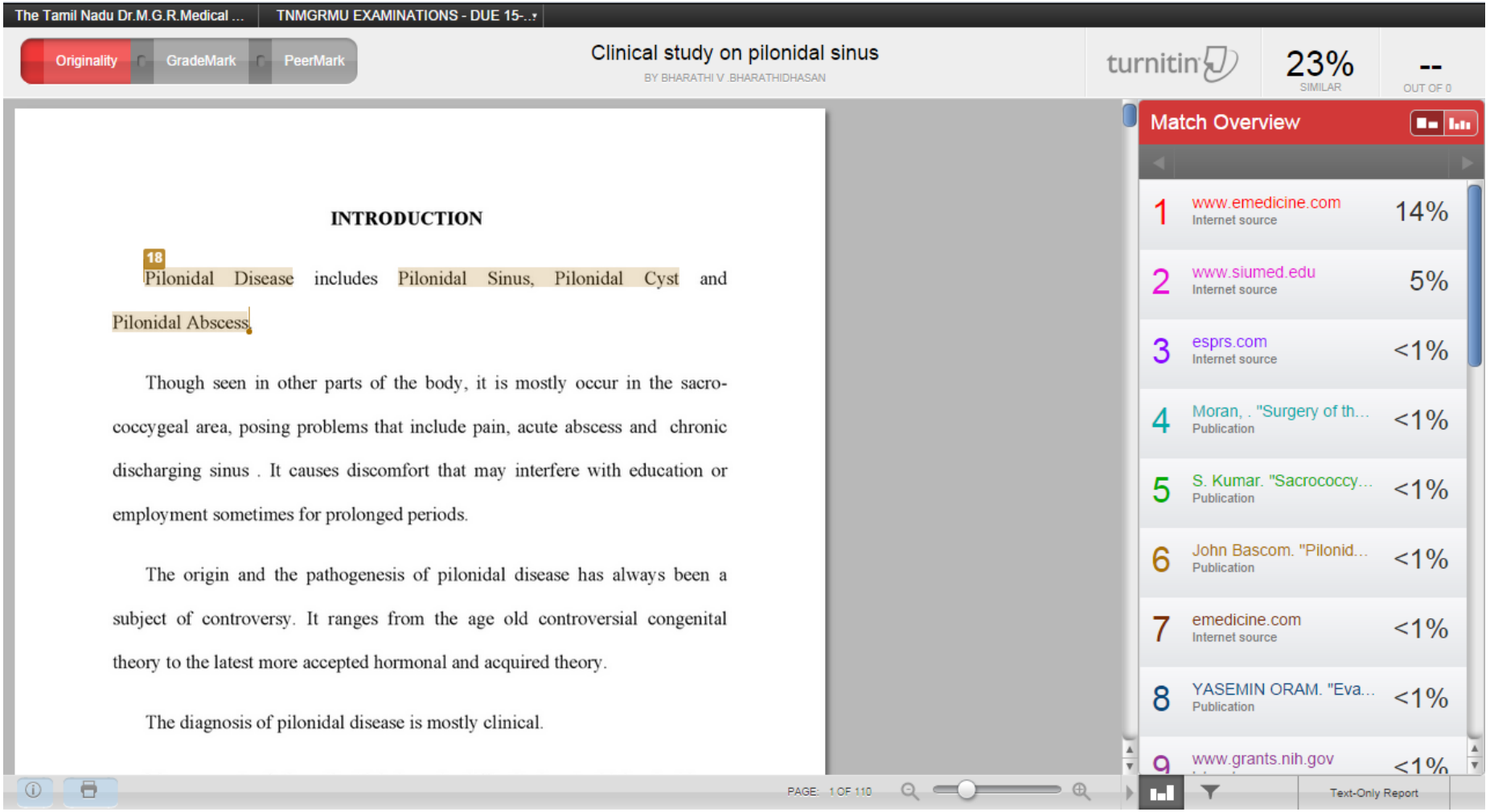
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INTRODUCTION
18
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The origin and the pathogenesis of pilonidal disease has always been a subject of controversy. It ranges from the age old controversial congenital theory to the latest more accepted hormonal and acquired theory.
The diagnosis of pilonidal disease is mostly clinical.
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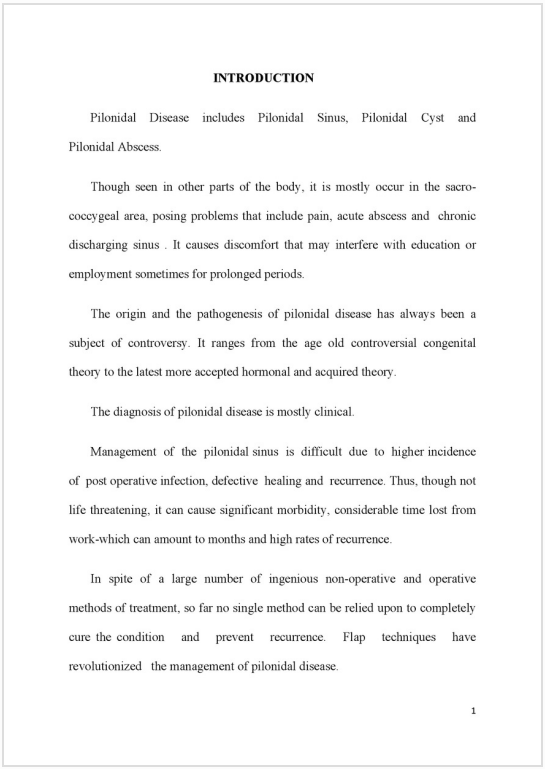

INTRODUCTION

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Management of the pilonidal sinus is difficult due to higher incidence of post operative infection, defective healing and recurrence. Thus, though not life threatening, it can cause significant morbidity, considerable time lost from work-which can amount to months and high rates of recurrence.

In spite of a large number of ingenious non-operative and operative methods of treatment, so far no single method can be relied upon to completely cure the condition and prevent recurrence. Flap techniques have revolutionized the management of pilonidal disease.

1

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methods of treatment, so far no single method can be relied upon to completely cure the condition and prevent recurrence. Flap techniques have revolutionized the management of pilonidal disease.

Good technique, less incidence of recurrence, less morbidity, less duration of hospital stay and good patient compatibility have made these procedures popular and acceptable with minimal cosmetic disfigurement.

Though many techniques are practiced, the LIMBERG'S RHOMBOID FLAP is one of the flap technique that was found to be efficient in the management of this condition.

Fig.-1 Pilonidal Sinus

Fig.-2 Pilonidal Abscess

OBJECTIVES OF STUDY

Comparative study of outcome of various surgical procedures in management of Pilonidal Disease in relevance to morbidity, hospital stay, complications and recurrence rate.

REVIEW OF LITERATURE

HISTORICAL ASPECTS

Pilonidal sinus disease was initially described by Mayo in the year 1833. Later it was also reported by Anderson in 1847. Warren in the year 1854 reported a case of an abscess containing hair in the natal cleft.

Hodges in 1880 was the first to use the name "pilonidal" derived from Latin "pilus" meaning hair and "nidus" meaning nest. The term literally means nest of hair, the epithelium lined sinus mostly contains hair.

It is called as "Jeepers bottom" as it was common in jeep drivers during World War II.

RELATED ANATOMY

Pilonidal sinus disease can affect different areas of the body, but most commonly it involves the sacro-coccygeal region of the natal cleft probably 4 to 5cm above the anal opening . The most common presentation of pilonidal sinus is a chronic discharging sinus in the sacro-coccygeal area in the midline natal cleft. Furthermore, the patient may have a series of openings in the midline or may have secondary lateral

openings superior to the midline pit. The sinus tract itself is smooth and lined with squamous epithelium. Eventually, the sinus tract leads to a subcutaneous cavity lined by granulation tissue and filled with nests of hair. The sinus tract openings are actually an extension of the deep cavity. This is why an abscess formation may present either in the midline or lateral to the midline.

The commonest site is the natal cleft over the sacro-coccygeal region but the extra natal sites such as finger webs (hair dressers, barbers, sheep shearers, milkers, dog groomers and people who work in slaughter houses), axilla, perineum, amputation stump, chest wall, umbilicus, and ear and supra pubic region may also develop pilonidal disease.

Fig.-3 Pilonidal Sinus in web space of the hand

The occurrence of a dimple of the skin in the post anal region is frequently observed.

INCIDENCE

During the Second World War from 1941 to 1943, 78,923 soldiers were affected and managed in Military hospital due to pilonidal disease. In the year 1973, more than 70,000 patients were admitted to non government hospital in the US with a primary diagnosis of pilonidal disease. In 1980, more than 40,000 patients with pilonidal disease were hospitalized in the United States averaging over 5days in hospital care. In India, the disease is not uncommon as might be thought even though incidence statistics are not available.

It primarily affects young adults and teenagers, the maximum incidence being between 19 and 25years. There is a 4:1 male predominance. Negroes and American Indians are almost immune perhaps because of their hair distribution. Caucasians were involved most commonly by that disease than black African or Asian peoples. Majority of patients were hirsute with strong wiry dark hair.

The incidence rate of pilonidal disease is approximately 0.7%.

AETIOLOGY

The aetiology of pilonidal disease has been a subject of controversy whether it is congenital or acquired. The congenital theory postulates secondary infection of a congenital remnant of epithelium resulting in a pilonidal sinus. The other theory proposes entrapment of epithelium and hair follicles in the sacro-coccygeal region. The later acquired origin of pilonidal disease is now more widely accepted.

The occurrence of disease is related to the appearance of hair for example thick, curly and profuse growth.

Various factors include:

- Friction in buttock
- Overweight
- Local injury
- Tissue papers for cleaning the perineum
- Increased duration of sitting and sweating

Other correlation factors are

- Overweight
- Same disease in family
- Vehicle driver

- Folliculitis or furuncle in that area

The disease occurs early in females due to earlier attainment of puberty in females.

PATHOPHYSIOLOGY

Controversy exists in the pathogenesis of sacrococcygeal disease for many years.

CONGENITAL THEORY

Most of the authors in nineteenth century believe that the pilonidal sinus disease was congenital in origin and they proposed a congenital theory based on their studies on the human embryo:

1. Neural canal remnants in the caudal region gets attached to the skin surface thereby accounting for recurrent cyst formation leading to rupture to produce a sinus tract.
2. The degenerated epithelial nests were sequestered, leading on to the formation of dermal inclusions.
3. As the human tail bud involutes because of the lack of development of the caudal appendix, tractions will be exerted which attracts the skin into the subcutaneous tissue region thereby resulting in the formation of an epithelium lined sinus tract.

ACQUIRED THEORY

Patey and Scarffl challenged the opinion that the lesion is congenital, and their view has since been supported by Hueston, Currie, Gibson and Goodall and by Davage. These writers have emphasized the following observations:

1. In spite of term "pilonidal" (hair bearing or hair growing), no one ever clearly demonstrated by microscopic sections that the hairs do in fact grow out follicles the suppurating tract. Such follicles seen in micro sections belong to hairs growing out of surface of the skin.

2. Hairs found lying within the tract or within zones of suppuration are loose, unattached dead hairs.

3. Hair found projecting out of the sinus opening is loose hair with the pointed end (the end furthest from the follicle) pointing into the lumen of the tract.

4. Lesions pathologically identical to the pilonidal sinus, occurring the inter digital clefts as an occupational disease of barbers, have been described by Currie, Gibson and Goodall, Hueston, and Patey and Scarfft. These inter digital sinuses-which by no stretch of imagination can be on an embryological basis-contain hair (customers' hair) and are for varying distances lined by epidermal cells as a down growth from the surface.

The opponents of the congenital origin of this condition state the following:

1. The congenital abnormalities are also found in the cervical and dorsal areas of the vertebral column similar to that in the sacrococcygeal region except that there is no associated pilonidal sinus.

2. Males and females are equally affected according to congenital aspects, but they are present more in males than in females

3. Many presents during the adolescent period thereby not getting concordance with the developmental theory.

4. The pilonidal sinus disease has a occupational prelidection for Jeep drivers and soldiers and barbers thereby against the congenital theory.

5. Similar description in other sites of the body.

6. Congenital theory postulates the suction of the hair and other skin appendages during dermal tractions. However there is lack of hair follicles and other skin appendages in the wall of the sinuses despite the presence of hair shafts, freely and deeply embedded in granulation tissue or scar and the lack of lining epithelium in most cases.

Though 50 to 75% of sinuses contain hair shafts during exploration, Hair has most importantly three roles.

1. De novo in the distended hair follicle can remain unshed and enhance micro abscess formation.
2. Free hairs from parts of the body can invade the follicles' open mouth and create foreign body reaction.
3. Skin hair in close vicinity to pilonidal wound irritates it mechanically, affecting healing.

Karyadakis postulated the pathogenesis of the pilonidal sinus disease. He attributed three main factors responsible for the hair insertion process :

1. The loose hair being the invader
2. And the force causing the insertion
3. The skin in the natal cleft vulnerable to the insertion of hair

MICROSCOPY

Microscopy revealed Enlarged and distorted hair follicles in the midline pits of the natal cleft and the basis of this is not known. Most common reason for insertion of hair is Vaccum.

Pathogenesis being the expansion of the cavity caused by the Occlusion of the mouth of hair follicles and rupture into the cavity leading to foreign body reaction and formation of micro abscess. Later they develops into chronic pilonidal abscess and rupture leading to foreign body reaction and micro abscesses. These become chronic pilonidal abscess and epithelialised tracts which are laterally displaced. The disease becomes a pilonidal sinus when burrowing occurs in the microabscess.

Microscopic examination of the pits revealed distorted hair follicles.

1) Distended hair follicles have a pit in the midline, which have the wide ranges of sizes depending on the originally distended hair follicles. The Normal ones, Moderately distended and overtly distended hair follicles have pits which were found in close proximity to each other.

2) Hair in the centre is surrounded by concentric keratin sleeves were found in the large pits with distorted hair follicles.

3) Germinal hair bud is seen in the pit wall.

4) Pits are seen in the midline in 90% of Pilonidal disease whose distribution pattern was determined by nearby hairs.

5) There is a considerable evidence that proves distorted hair follicles have pits in the midline

Fig.-4 Dilated follicle with central hair. Varying sizes of follicles. Right side has a normal hair follicle with left side showing a pit.

MECHANISM:

Enlargement of the normal follicles occurs by two kinds of forces. One is the outward force that is due to the accumulated keratin. And the other one is the inward force by the vacuum. Other forces may also come into play.

Stages of the pilonidal disease are revealed by sectional microscopic examination.

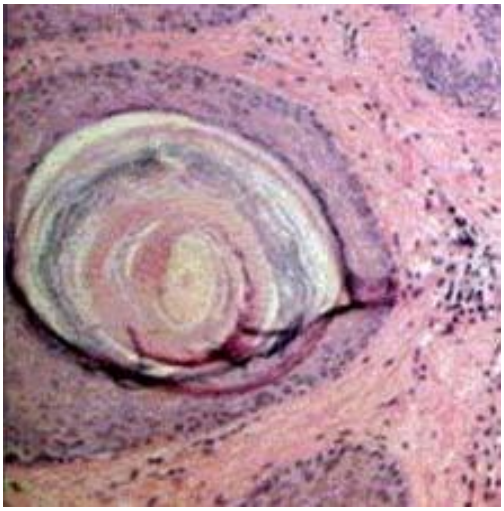


Fig.-5 Keratin accumulation

STAGES OF THE PILONIDAL DISEASE AND MICROSCOPIC EVIDENCE :

Infection followed by edema – closes the mouth of the follicle. The base of the follicle where keratin and hairs come out is the site of the infection around the enlarged follicle. Contents does not escape and the follicular mouth is hidden.

Hair shafts left behind in the walls of the abscess will heal. The hair creates the hole in the epidermis through which it breaks and lie outside and inside the body.

The outward force driven by the accumulated keratin and the inward pulling force by the vaccum pushes the pus found in follicular content towards the fat. Therefore, the infected contents are released

because of the accumulation of pus and blows out of the follicle's bottom.

The above mentioned pathologic process almost results in the formation of acute pilonidal abscess and such abscess eventually drains outside. After the drainage of the abscess, again the mouth of the follicle reopens due to the reduction of the edema.

Remnants of the follicle, whose both ends are opened now, creates a cavity at the outer end which results in the formation of chronic pilonidal abscess. This cavity has similar inward and outward forces responsible for maintaining the cavity. This evidence conclusively proves that hair follicles which are distorted are midline pits.

Pathogenesis of pilonidal disease is best explained by theories putforth by Bascom and Karyadakis. Hair and hair Follices are the important predisposing factors in the pathogenesis of the pilonidal sinus disease.

WHY MIDLINE IS MORE COMMONLY INVOLVED :

Skin cells and the hairs smash together in the midline areas. The scales and barbs in hair, and the vertical walls on either side of the midline which during walking gives a cleft wall shift in combination

with barbs on hair which imparts motion to hairs, thereby causing hairs to push against midline cells where the skin in the midline area is punctured and ultimately results in the accumulation of follicles. So, midline pits are very common in the pilonidal sinus disease.

MANAGEMENT :

Management plan of pilonidal disease depending upon the following.

- Nature of presentation and stages of pilonidal sinus.
- During the exploration of the pilonidal sinus through lateral incisions, the instrument explores the pilonidal abscess cavity to the underside of the pit which has blown out or to a pit that has blown in to fat which in turn starts to express a pasty white material from the abscess cavity.
- These findings implicate midline pits and their contents as a possible source of the disease.

MECHANISM

- In standing posture, the gluteal tissue is separated away from the sacrum because of gravity and thus the vaccum is created which sucks air into the cavity along with the vagrant hairs that were gathered in the gluteal cleft.

- Furthermore, these pass through the follicular remnant to join the accumulated pus.
- This vaccum was measured by Brearly, who demonstrated this mechanism by explaining when the patient sits, the gluteal tissues will be pushed against sacrum and thereby sealing the exit of the sinus added by the squeeze of the buttocks together while sitting.
- The pressure required to drain the fluid from inside to outside of the sinus onto the chair must be more than 125mm Hg and such pressure was not attained inside during sitting, therefore the pus was driven through fat, creating tunnels thereby accounting for the abscess collection from the site distant to the site of hair follicle of origin.

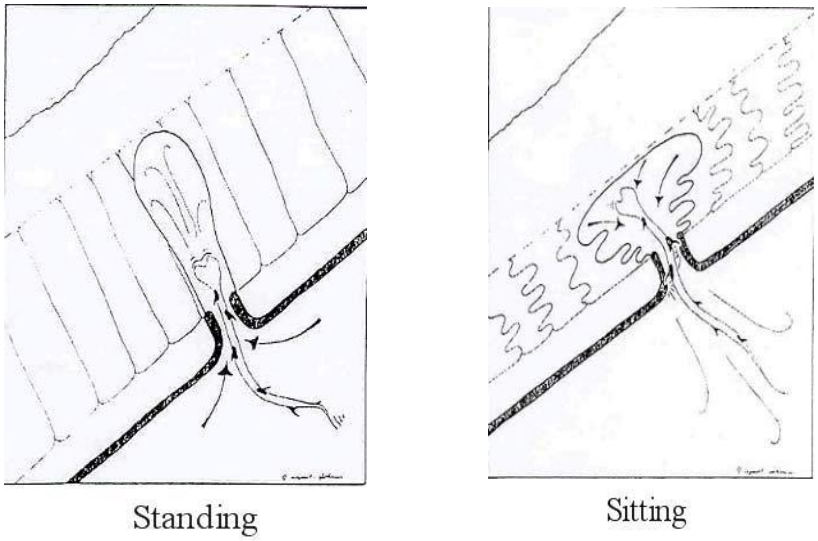


Fig.-6 Pictorial depiction of formation of abscess in pilonidal sinus disease

HORMONAL ORIGIN

- During the period of Pubertal growth, there was a sex hormonal surge which has major implication in the growth of the pilosebaceous glands, which results in the formation of hair follicle with keratin.
- This results in the formation of folliculitis, which produces oedema and follicle occlusion. The infected follicle invades into the subcutaneous tissue and ruptures to form the abscess thereby creating a sinus tract which extends into the subcutaneous cavity.
- The hair follicle grows cephalad thereby accounting for 90% cases having a sinus tract in the cephalad direction and it was approximately 5 – 8 cm from the anus.
- In some instances, the sinus is located caudally and is found 4 to 5cm from the anus wherein it is formed because of the sinus overlying the sacrum drains into the skin surface while the original sinus formed from the natal cleft becomes completely epithelialized leaving behind the laterally communicating sinus tract alone which granulates and forms the sinus tract opening.
- The basis of the pilonidal sinus disease is because of the foreign body reaction of the host tissue to the hairs. Loose hairs are sucked into the pilonidal sinus whenever the sits or stands, by

friction and movement of the buttocks.

- The tip of the hair enters into the cavity and becomes entrapped as the barbs on the hair prevents it from being expelled.
- Thus, the hair which is trapped inside the cavity elicits a foreign tissue reaction thereby predisposing to pain, infection and abscess and eventually chronic discharging sinus from the opening.
- There are rare circumstances, wherein the foreign body other than human hair causing the pilonidal disease was usually a birds feather, the type used to stuff feather bedding.

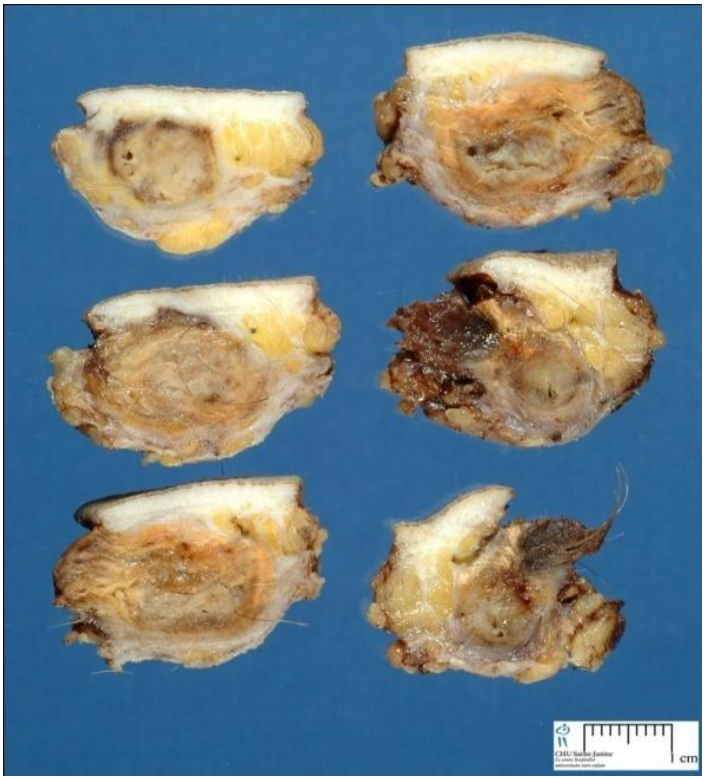


Fig.-7 Cut sections showing pilonidal sinus disease

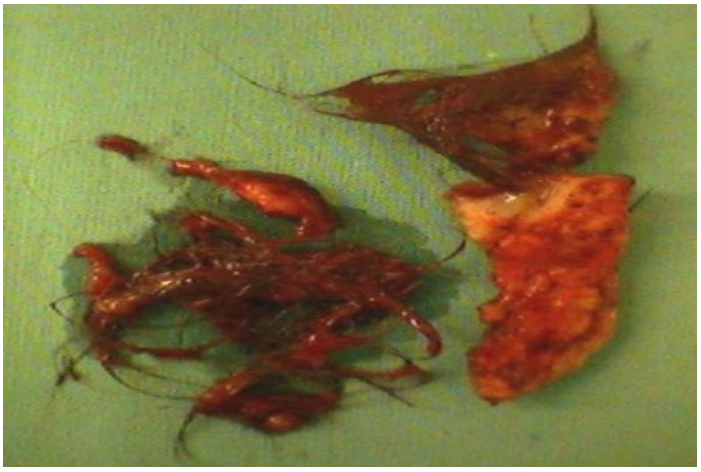


Fig.-8 Gross specimen of a pilonidal sinus

PATHOANATOMY

The occurrence of a dimple of the skin the post anal region is frequently observed. Few authors, while examining recruits during World War-II, recorded some of the minor anatomical variations in the perianal region. Out of 3,136 male recruits, a distinct post anal dimple was observed in 287 individuals, an incidence of approximately 9%. A dimple in this region has the same significance as a dimple at other sites (e.g. cheeks, chin, sacral region or knees). Anatomically all these dimples represent nothing more than a local fixation of skin by dense collagenous fibers to underlying bone or fascia. However, the occurrence of a dimple at this site, associated with other factors, may be important in the development of pilonidal suppuration.

Fig.-9 Picture showing a post anal dimple in an infant

In possessing a deep post anal dimple, the use of toilet paper in an antero- posterior direction may well serve to impact a paste made up of broken bits of hair plus faecal material deeply into the dimple with each successive wipe. Davage [13] quotes from a personal communication from Dr. K. C. Samuel of the Department of Pathology at Jaipur, India,

"*Pilonidal sinus is very uncommon in India. Personal cleansing after defecation is by ablution, and toilet paper is never used by the native population.*"

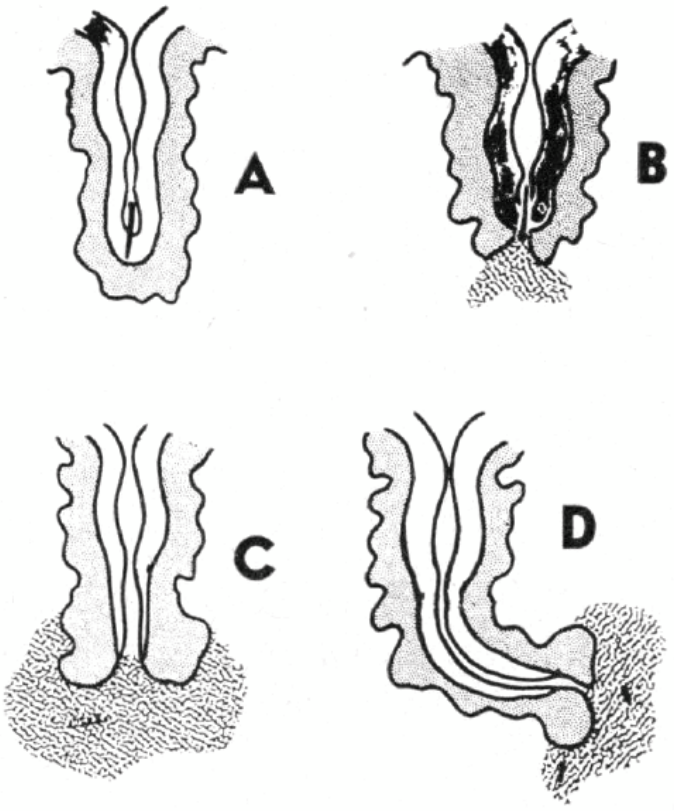


Fig.-10 Pilonidal sinus in post anal dimple

A - Diagram showing a loose hair trapped at the bottom a post anal dimple and beginning to penetrate epidermis by the sharp pointed end.

B and C - Successive stages of inflammatory reaction to the persistent foreign body. D - Epithelization of a portion of the tract so formed.

Dr. V. L. Parmar, Professor of Surgery, Grant Medical College, Bombay in a personal communication to Dr. Alan. A. Klass (Associate Professor, Department of Surgery, University of Manitoba; Associate

Professor, Department of Anatomy, University of Manitoba; Assistant Sturgeon, Winnipeg General Hospital.) Dated April 4, 1955, states:

"*It is an invariable practice for all Indians to use water for cleansing after defaecation, and not toilet paper. Using of toilet paper is looked down upon as being very unhygienic, and in this country people always use water. These pilonidal sinuses and cysts are not common in this country, and although I have been attached to three general public hospitals during the last five years, I have not operated on more than three cases.*" [9]

In the matter of prophylaxis with individuals subject to pilonidal suppuration, this triad of post anal dimple, loose bits of hair and fecal residue are all important. The additional traumatic factor of prolonged sitting, like in jeep drivers, may provide the final link in the chain of events leading to suppuration.

The local anatomy of the inter natal cleft in the immediate area of the post anal dimple has an influence on the spread and persistence of an inflammatory process. The dense network of collagen firmly attaching the deep surface of the skin to the subjacent periosteum of the coccyx and sacrum is noted to prevent spread. The fatty tissue in this central portion consists of a series of minute fatty cushions lying between the

dense strands of fibrous tissue. In the lateral areas, however, the proportion of fat to collagen becomes reversed, and large areas of fatty tissue become interlaced with thin fibrous strands.

The density of the central zone of fibrous tissue is such as to produce, in the event of suppuration, an irregularly shaped area of inflammation with innumerable small zones of necrosis corresponding to the spaces previously containing fat. Extension into the loose lateral spaces, when it occurs, is in an irregular manner like so many pseudopodia. Once in this area, the extension meets little resistance from the thin fibrous strands. In the usual low-grade infection there is no way of determining on clinical grounds just how extensive these minute finger-like processes of infection may be. Most dissections leave behind tiny islands of infected necrotic tissue in the terminal portions of extensions. Post-operative fibroplasia is more than likely to seal these off from the central zone, encouraging further and wider lateral extension. It will leads to high rate of recurrence.

It is the complexity and irregularity of this spread into the lateral fatty zones that promotes chronicity, which eludes complete excision, that so frequently defeats primary structure, and that so often promotes recurrence. For a short distance along the tract so formed, a down

growth of surface cells gives the appearance of a skin- lined tract. But this extends for a short distance only. The active inflammatory zone is a simple tissue space infection, very irregular in outline, without lining, and containing the debris of loose hairs plus granulation tissue or pus.

STAGES OF PILONIDAL DISEASE

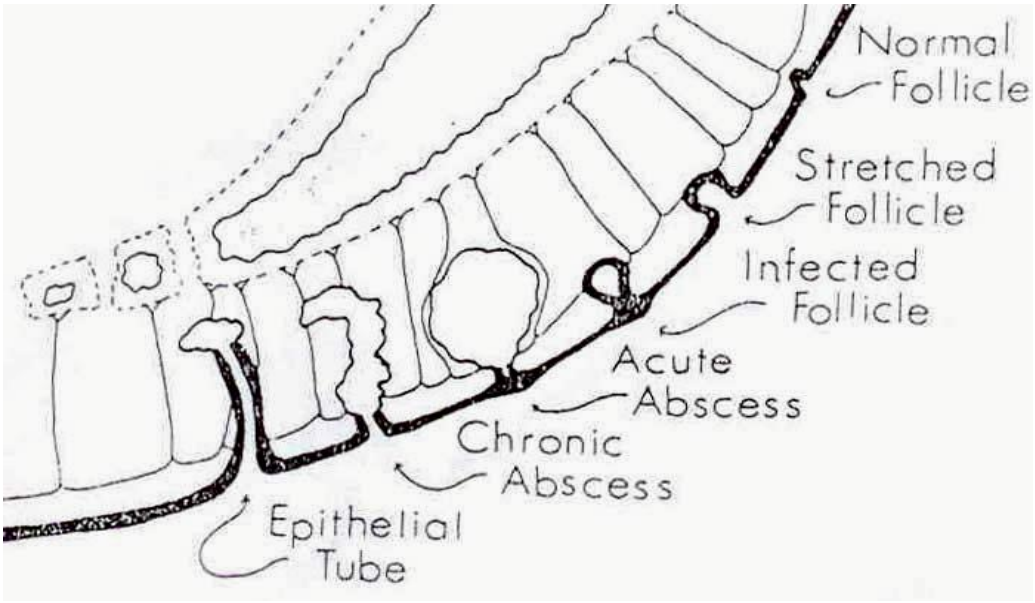


Fig.-11 Stages of pilonidal disease

- STAGE I - **Normal follicle.**
- STAGE II - **Follicle becomes distended with keratin.** It was the Fibrous strands which suspend follicle and skin from sacrum.
- STAGE III – **Distended follicle** becomes infected and oedematous

closing the mouth. Because of the pressure increase inside the infected follicle, rupture occurs which invades into fat causing acute collection of pus called Acute abscess.

- STAGE IV - Chronic pilonidal abscess. The ruptured follicle which is open at both ends forms the mouth of the abscess.

- STAGE V – Stage of Epithelialisation. The normal epithelium grows lining the sinus tract forming epithelial tube.

CLINICAL FEATURES

Pilonidal sinus disease has a wide range of clinical presentations ranging from asymptomatic pits to chronic draining sinus tracts which are more common in the sacro coccygeal regions and in persons who have abundant hairs in that region and who succumb to chair most of their lifetime.

Several reports show that pilonidal sinus has a tendency to occur in interdigital spaces in barbers, sheep shearers and dog groomers. Rarer reports mentioned its occurrences in finger tip pulp and penis.

Pilonidal sinus occurs in either sex except that it occurs a little earlier in females owing to their prematurity.

Studies on the routine physical examination of Minnesota college students showed 364 out of 31597 males (1.1%) and 22 of 21467 females (0.11%) had pilonidal sinus.

The inference being the pilonidal sinus predominates in the males during their second and third decades but however in the children, the disease predominates in the female with a female to male ratio being 4 : 1.

The most common presentation in patients with pilonidal disease being the pits or holes in the gluteal cleft. And studies on the Iraq soldiers of 1000 members showed, Out of 88 members who had pilonidal sinus, 48 were asymptomatic and 40 presented with symptoms.

Another common presentation is chronic or recurrent discharging sinus.

Fig.-12 Asymptomatic Pilonidal Sinus

Fig.-13 Recurrent pilonidal sinus showing bridging and fibrosis

Sondenaa et al. noted discharge in 66%, swelling in 50% and pain in 35% of chronic pilonidal disease presentations. 50% of patients present with abscess and with discomfort or pain following physical activity or after a long drive due to prolonged sitting. They also present with acute purulent discharging sinus, with inflammatory changes like pain and swelling.

Fig.-14 Pilonidal abscess-note the signs of inflammation

The patients usually have a waxing and waning phase because of spontaneous drainage from the secondary sinus and again get reinfected and spontaneous rupture occurs accounting for waxing and waning phase. The most common organisms cultured from the abscess are anaerobic organisms like bacteroides and anaerobic cocci accounting for 77% and aerobic organisms of about 4% and both are cultured in about 17%.

The sinus usually tracks into cephalad direction in majority of cases but in some cases like in about 7% track toward the anus and presents as perianal sepsis.

Most dreaded and rare complication of the pilonidal sinus being the carcinomatous change from the long standing sinus of squamous cell or spinocellular variety have been reported. They carry a very high recurrence rate and usually have a poorer prognosis than a regular non melanoma skin cancer.

Although the pilonidal sinus manifests as an abscess or pilonidal sinus or a recurrent or chronic pilonidal sinus or a perianal pilonidal sinus, the most common manifestation being a fluctuant and painful mass in the sacro coccygeal region. It occurs most commonly in the young adult who is symptomatic.

PRESENTATION:

Most common symptoms being the pain and the purulent discharge from the sinus opening in about 70 – 80% of the time.

And 50% of the patients initially presents with acute abscess which is cephalad to the hair and the sinus infection.

Earlier stages being a cellulitis or folliculitis stage. It is when the folliculitis expansion into the subcutaneous tissue, an abscess is formed or when a pre-existing foreign body granuloma becomes infected. Those cavity and the sinus tract and laterally oriented sinus tract openings are generally lined with granulation tissue whereas the midline sinus pit is lined by epithelium.

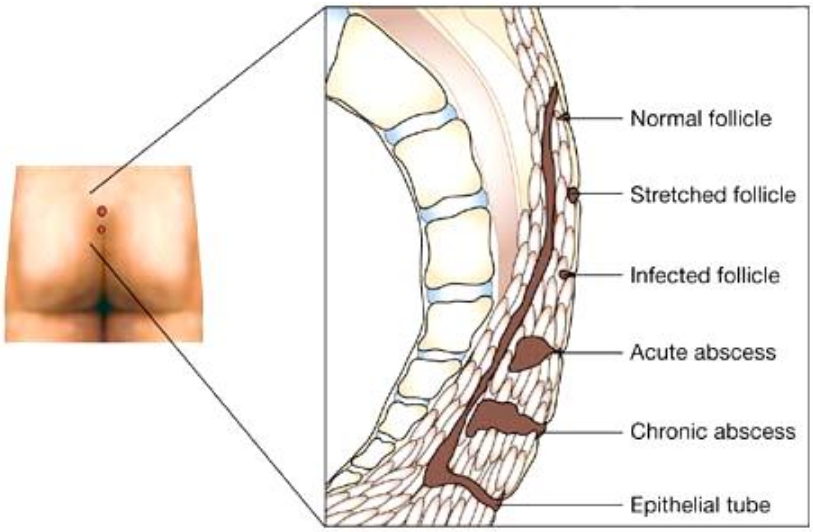


Fig.-15 Diagrammatic representation of Pilonidal Disease

DIAGNOSIS :

Palpation of a deep indurated region beneath the skin in the sacral region and the presence of an epithelialized follicle opening. When you palpate the tracts, these usually track in the cephalad direction. Wherein in a case where perianal sepsis is noted, the tract must have run in the caudal direction.

Patients with a more benign cause, present with chronic discharging sinus with intermittent exacerbations and remissions after incision and drainage.

Fig.-16 Multiple sinus pits running cephalad with hair seen protruding out of the pit

RECURRENT / CHRONIC PILONIDAL DISEASE

DEFINITION:

Patients with chronic discharging sinus without an acute exacerbation tend to have a recurrent or chronic pilonidal disease.

PATHOGENESIS:

- Hair follicle is not the inciting agent in chronic or recurrent pilonidal disease.
- It refers to patients with a pilonidal sinus that is associated with a chronic discharge without an acute abscess and it is seen after incision and drainage of a pilonidal abscess.
- So in such circumstances, the sinus would not have been excised and it is still there after the abscess cavity heals and recurs later.
- Pathology behind the chronicity or recurring ability of the sinus is that Unhealed surgical wound becomes filled with granulation tissue, hair and skin debris which acts as a nidus for the ongoing foreign body reaction and further inflammation. This along with midline cleft hairs responsible for the chronicity and recurring ability of the disease.

Fig.-17 Recurrent pilonidal disease

ENDOANAL PILONIDAL SINUS

Rare variety

Involves the perianal skin directly or circumferentially around the anus, involving the anal verge skin.

THREE MOST IMPORTANT CAUSES OF ENDOANAL PILONIDAL DISESASE :

- Perianal fissure of fistula which communicates with the anal canal was created by the pilonidal sinus which tract down caudally.
- Post Operatively, in a fistula in ano patient, hair enter inside the healing wound thereby creating a pilonidal sinus.

- Hair may normally enter and penetrate the anoderm eliciting a foreign body reaction in the sacrococcygeal region.

INFECTION

Anaerobes predominates aerobes in causing the reinfection and wound breakdown following surgery. The most common anaerobic bacterias responsible as Bacteroides and Enterococci and among the aerobes staphylococci and haemolytic streptococci are most common.

COMPLICATIONS [10, 18]

The most common complications of pilonidal disease are:

- Recurrence of the abscess is by far the most common complication. Most literature reviewed quote a rate between 40% and 50%.
- The next complication is the recurrence of pilonidal disease. Recurrence can be early recurrence and late recurrence
    - Early recurrence – due to failure of identification of one or more sinuses during surgery
    - Late recurrence is commonly due to secondary bacterial infection of the residual debris which was not completely removed during the surgery, improper wound care or insufficient attention to depilation.

- Wound infection after primary incision and drainage is rare but described.

- Squamous cell carcinoma after recurrence of pilonidal disease has been described; it is in incidence but, when diagnosed, requires en bloc surgical resection and appropriate oncologic care with local radiation and possibly chemotherapy.

PROGNOSIS

Long-term prognosis for pilonidal disease is excellent and mortality is practically nil, unless squamous cell carcinoma develops, though abscess recurrence is common as described.

DIFFERENTIAL DIAGNOSIS [3]

The distinctions among pilonidal disease are:

ANAL FISTULA

Several study of surgical literature mention the difficulty in differentiating pilonidal disease from anal fistula and hidradenitis suppurativa. Pilonidal disease may result in sinuses that reach the perianal region and simulate an anal fistula. A valuable clinical observation in establishing diagnosis of anal fistula is palpation of the tract leading to the secondary opening to the anus. When no

secondary opening is observed and no tract is palpable, the possibility of an extra-anal source of the infection must be considered.

HIRADENITIS SUPPURATIVA

A chronic inflammatory disease of the apocrine sweat glands in which folliculitis and local friction also play a role, in patients aged 30years or older, especially with co-morbidities such as diabetes and obesity.

CONGENITAL ABNORMALITIES

In some congenital lesions (meningocoele), a continuous tract with the central cord of the spinal cord may occur, and discharge of CSF may be present

PERIRECTAL ABSCESS

Location of the lesion is the best means to differentiate this entity from pilonidal disease. Perirectal abscesses frequently require emergency surgical consultation for formal drainage in the operating room.

- Primary presacral or sacro-coccygeal sinus
- Furuncle or carbuncle
- Pyoderma gangrenosum

- Pyoderma gangrenosum is an ulcerative lesion also generally seen in the fourth decade of life with other co-morbidities.
- Syphilitic granuloma
- Tuberculous granuloma
- Sebaceous cyst & Dermoid cyst
- Sacral Osteomyelitis with draining sinus.

MANAGEMENT

The management of the pilonidal sinus depends on the presentation of the disease. The common clinical presentations of the pilonidal sinus disease are categorized into 3 categories. These are:

1. Acute pilonidal abscess,
2. Chronic pilonidal disease, and
3. Complex or recurrent pilonidal disease.

The surgical management is then tailored to the above classification category. The goals of the ideal procedure for the treatment of this disease should be:

1. Low recurrence rate with better wound healing.
2. Lesser hospital stay
3. Convenience to the patient
4. Less complications with fewer morbidity
5. Early return to normal activities as early as possible.

Various non-surgical and surgical modalities of treatment have been advocated in the management of Pilonidal Disease:

NON-SURGICAL

- Injection of sclerosing agent
- Fibrin Glue
- Cryo-surgery
- Electro-cauterization
- Repeated shaving or use of depilation creams

SURGICAL

- Drainage with/without excision
- Marsupialization
- Excision with healing by secondary intention
- Excision with primary closure

To prevent the recurrence rate and chronicity, various other techniques are brought into action. They are

- Karydaki's flap
- Bascom procedure
- Modified Bascom procedure

And other procedures which use the technique of transposition flaps have been described. They are:

- Z plasty
- V-Y fascio-cutaneous advancement flap
- Crossed Triangular Flaps
- Gluteus maximus musculo-cutaneous flap
- Rhomboid flap of Limberg

The above mentioned surgeries have low recurrence rate by reducing the depth of the natal cleft and place the suture line away from the midline natal cleft and with low tension at the suture lines.

CONSERVATIVE TREATMENT

Conservative treatment needs longer period to achieve positive results and there is low incidence of cases being proceeded to excisional procedures following this.

The treatment includes

- Hair control by shaving the natal cleft
- Removal and scraping of the granulation tissue
- Laser depilation of the natal cleft hair

- Cleaning out the natal cleft and removing all hairs
- Frequent washing of the parts with detergent and water and with a solution containing equal parts of witch hazel and alcohol
- Avoidance of prolonged sitting.

INDICATIONS :

First time presentation with mild symptoms

Armstrong and Barcia studied the role of conservative, non-operative treatment of pilonidal sinus disease at an army hospital for a period of 17years and only a few required excisional treatments. [40]

A-Natal cleft with pilonidal sinus B- after 3 treatments C-after 7 treatments

Fig-18 Laser epilation of pilonidal sinus

TREATMENT OF ACUTE EXACERBATION (ABSCESS)

A pilonidal abscess is managed by incision, drainage, and curettage of the abscess cavity to remove hair nests and skin debris.

This can be accomplished in the surgical theatre or in the emergency department under local anesthesia. If possible, make the drainage incision laterally, away from the midline, opened through a small incision. All hairs and granulation tissues removed. Track can be destroyed by careful instillation of pure phenol solution.

Wounds heal poorly in the deep intergluteal natal cleft, which allows frictional movement of one buttock over the other. The wound should be cleansed daily in the shower or with a sitz bath.

Paying close attention to hygiene and hair shaving of the surrounding area are important to prevent hair from penetrating the healing scar. This meticulous treatment of the diseased area should continue for approximately 3 months, even after the wound has completely healed.

In more than 90% of cases, the wound heals completely in approximately 1 month. Incision and drainage, without curettage results in wound healing in approximately 60% of patients within 10 weeks. Of

these patients, 40% develop a recurrent pilonidal sinus, requiring further treatment.

Inform patients that drainage of the abscess is not a curative procedure. Some studies have shown that as many as 85% of patients require further surgical treatment. Excising the pilonidal pit at the time of abscess drainage reduces the recurrence rate to 15%. The difficulty with doing this is that the pilonidal pit initially cannot be identified during the first drainage procedure of the abscess. Approximately 5days later, when the oedema is reduced, the pit can be identified. Often, having the patient return 5-7days after abscess drainage to identify the pit and to excise it with a small incision is possible.

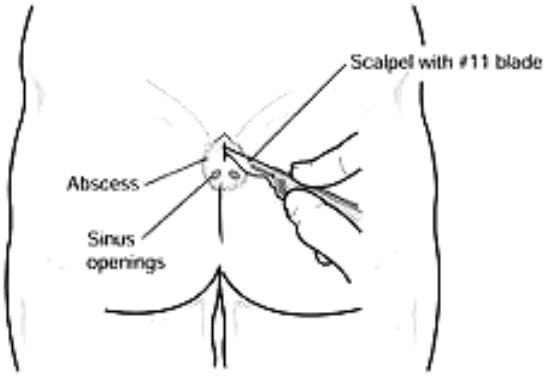


Fig-19 Diagrammatic representation of incision and drainage

A-Pilonidal Abscess

B-Aspiration of Pus

C-Incision and Drainage

D-Packing of wound

Fig-20 Pilonidal abscess incision and drainage

MEDICAL THERAPY

1. INJECTION OF SCLEROSING AGENT [36, 37, 84]

Phenol injections used as treatment of the pilonidal sinus are more common in Europe than in the United States. Both chronic pilonidal disease and acute pilonidal abscess (after drainage) may be managed by phenol injection. Eighty percent phenol is injected into the sinus, left there for 1minute, and then expressed out of the cavity.

The sinus is then curetted. This may be repeated as many as 3 times for a total of 3 minutes of phenol exposure at one treatment. The treatments may be repeated every 4-6weeks as necessary as wound healing progresses. Paraffin jelly may be used to protect the skin from the phenol, which destroys the epithelium.

Phenol sterilizes the sinus tract and removes embedded hair. Phenol injections may be combined with local excision of the sinus. Wound healing usually requires 4-8weeks.

The incidence of recurrence is reported to be approximately 9–27%, which is similar to the incidence following simple excision and packing open the wound. Because of the intense local inflammatory response after the phenol injection, patients usually stay in the hospital overnight. Thereafter, the patient

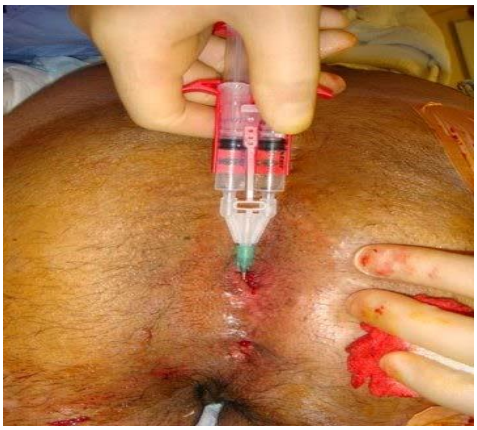
is allowed to return home with instructions to bathe daily and keep the area shaved. Dressings are used for comfort.

2. **FIBRIN GLUE [45]**

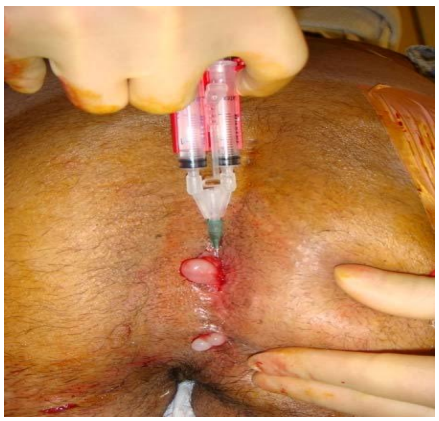
Curettage followed by injection of fibrin glue. Promising early results with improved pain scores and earlier return to normal daily activities

A-Delineating the sinus tracts

B-Curetting the sinus



C-Injection of fibrin glue into the tracts



D-The fibrin glue seen coming out of the tracts

Fig.21Procedure of injection of fibrin glue

3. CRYOSURGERY [3, 46]

The sinus tracts are laid open and curetted and the open wound is then sprayed with liquid nitrogen for about 5minutes. It can be done as an out–patient procedure. But there is delayed healing especially at the skin level. And recurrence rates are as high as 20%

4. ELECTROCAUTERISATION [3, 47]

This is done under local anesthesia. The sinus tracts are opened with a diathermy knife. Track curetted and hair removed and the track is cauterized. Patient is sent home with a mild analgesic. The procedure can be repeated depending up on the healing. The rate of recurrence is 11%.

Fig-22 Electrocauterisation

The surgical options for management of a non-complicated chronic pilonidal sinus include:

1. excision with primary closure.

2. excision and laying open of the tract.

3. wide and deep excision to the sacrum.

4. incision and marsupialization.

All the surgical procedures are carried out under general or spinal anesthesia with the patient in a prone or jackknife position. After shaving off the hair and cleaning the area, methylene blue dye mixed with hydrogen peroxide is injected in the external openings to give a guideline for the tract and branching.

1. EXCISION WITH PRIMARY CLOSURE [35, 57]

Excision of a pilonidal sinus entails excision of the midline pits and lateral openings down to the presacral fascia, with removal of minimal surrounding skin. In general, removing more than 0.5cm of skin surrounding the sinus opening is not necessary. Curetting the wound to remove the hair, granulation tissue, and skin debris is essential to promote adequate wound healing. Although performing this procedure under local anesthesia alone is possible, mild sedation in addition to local anesthesia allows for a more complete excision and a more comfortable patient.

Lord and Millar in 1965 described and popularized their technique of coring out the midline epithelial follicles under local anesthesia, but they also included a brush in their procedure to cleanse the cored cavity of hair and any hair left over in the remaining laterally

oriented granulation-lined tract. [34] The brushing of the tracts continues in the outpatient setting in the postoperative period until the tract heals completely and closes. At about the same time 50% phenol was used after curettage to destroy the epithelial component of the track.

Schneider et al. in 1994 reported that phenol injection gave similar results to surgery with patients staying in hospital for 1–2 days and returning to work within weeks; 60% of sinuses showed complete healing with an average healing time of .2weeks. [36] The follicle excision sites may be closed primarily but are usually packed and dressed to heal by secondary intention.

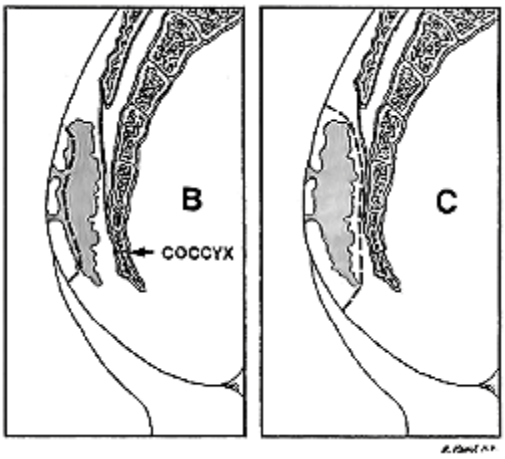
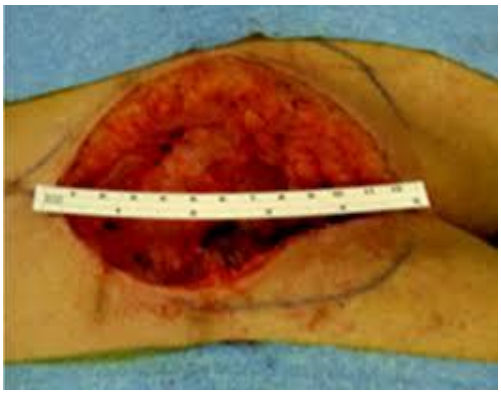


Fig.-23 Depth of excision required


A-Simple excision of pilonidal sinus -Primary closure of wound


C-Excision of sinus **Primary closure with drain**




E-Excision **F-Primary closure with drain**

Fig.-24 Excision with primary closure

MODIFIED BASCOM TECHNIQUE [8, 18, 19, 48, 73]

More recently, Bascom described using a lateral incision for entry into the pilonidal cavity. Curettage of the cavity is accomplished through this lateral incision, which is not excised. The midline pits are excised separately, including the epithelialized tube. The midline incisions are closed, while the lateral wound may be either left open to drain and heal by secondary intention or closed primarily.

The advantages of a primary closure are small wounds, quicker healing time, usually within 3weeks, minimal wound care, earlier return back to work and no need for daily scheduled dressing changes. The obvious disadvantages are wound infection and wound dehiscence.

Rather than primarily closing a midline or lateral vertical incision, some physicians advocate the use of asymmetrical or oblique elliptical incisions in an attempt to keep incisions out of the natal cleft where wound healing is poor and to prevent unnecessary tension on the closure of the wound. The goal of the asymmetric incision is to reduce the depth of the gluteal fold, thereby eliminating the frictional forces between the 2 opposing skin edges. Although the use of an incision that crosses the vertical gluteal fold to excise the pilonidal cavity does eliminate a vertical suture line within the gluteal fold, healing times may remain considerable.

Skin flaps have also been described to cover a sacral defect after wide excision. Similarly, this keeps the scar off the midline and flattens the natal cleft. The potential complications include loss of skin sensation in the flap, which is observed in more than 50% of patients, and necrosis of the flap edges. Again, primary healing is achieved in 90% of cases.

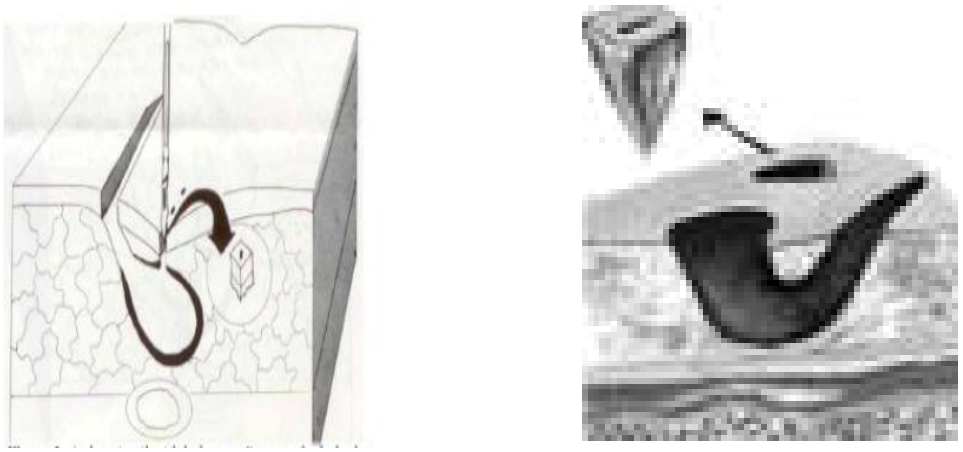


Fig.-25 Bascom technique uses the lateral incision away from the midline to excavate the sinus tracts and excise the pits individually. The mid line pits are sutured while the lateral would is sometimes left open.

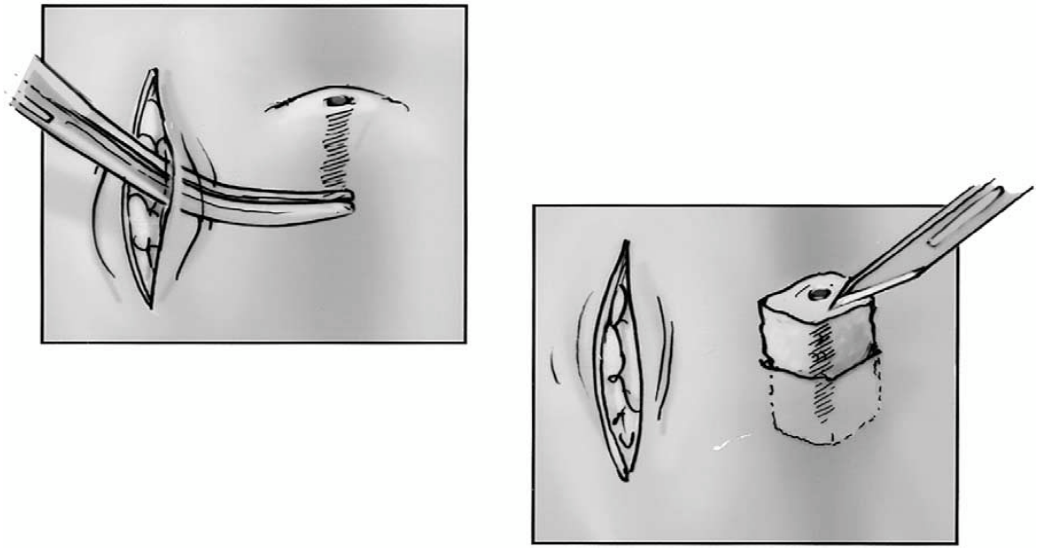


Fig.-26 In the Bascom operation, midline pilonidal pits or follicles are excised. One to 10 follicles can be removed, leaving wounds 2–4 mm in diameter. The sinuses or cavity are opened through an incision 2 cm lateral and parallel to the natal cleft. The lateral incision undermines the midline and gauze is pushed through the cavity to ‘‘scrub out’’ hair and granulation tissue

2. EXCISION WITH LAYING OPEN OF TRACT [10, 18, 31,39]

Excision of the pilonidal sinus and laying the tract open to allow healing by secondary intention has been described as an option to ensure that the cavity has adequate drainage. This avoids a wound infection after primary closure. Consider laying the tract open when the primary closure is not free of tension. Even after excision of the pilonidal sinus down to healthy presacral fascia, the wound is still considered contaminated. Both aerobic and anaerobic organisms are found in 50-70% of wounds. The disadvantages of laying the tract open are the inconvenience to the

patient, with frequent dressing changes, and close observation of the wound to ensure proper wound healing and avoid premature closure of the edges. The average time for wound healing to occur is approximately 6weeks.

Laying the tract open is always appropriate when there is cellulitis surrounding the pilonidal sinus. Primary wound closure versus wound healing by secondary intention are the 2 principal surgical options for a chronic pilonidal sinus. This is associated with a low recurrence rate but slow healing.

In a group of 146 patients with pilonidal sinus, Isbister and Prasad felt the procedure could be done safely on an outpatient basis. Differences remain between these 2 techniques in terms of wound healing and recurrence. Although primary closure has the potential for earlier wound healing if infection does not occur, it does require that the patient restrict many activities until wound healing is complete. This is because a primary closure is rarely completely free of tension and the wound is considered contaminated despite excision and debridement.

Recurrence rates after primary closure may be as high as 38%. Not uncommonly, wounds may require 4-6months to heal, but on average, the healing time is approximately 2months. The reduced recurrence rate

is felt to be due to the more broad based, flattened and hairless scar produced by secondary intention. This prevents buttocks friction, hair penetration and hair follicle infection. Although advantages exist, these open wounds require aggressive management with frequent dressing changes and close observation by both the patient and the surgeon.

A-On table picture of laying **B-9days post excision** **C-12days Status**

D-16days post excision **E-20days post excision** **F-22days post excision**

Fig-27 Excision with laying open of tracts

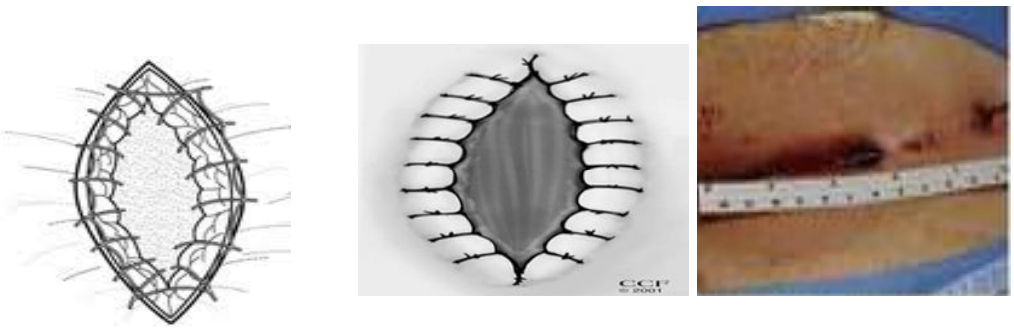
3. EXCISION WITH MARSUPIALIZATION [10, 18, 66]

Marsupialization as a treatment option of a pilonidal sinus was first introduced in 1937. Marsupialization is a compromise between primary wound closure and wound healing by secondary intention. The rationale is to avoid wound infection and dehiscence after primary closure and frequent packing of the open wound. With marsupialization, the

wound is sutured open. After excision of the pilonidal sinus cavity, and lateral tracts, the cavity is then scrubbed and curetted to remove hair and granulation tissue. The skin edges of the wound are then sutured to the presacral fascia. The wound is then loosely packed and requires daily dressing changes.

Marsupialization provides the patient with a smaller wound compared to wounds that are left open to granulate. By suturing the wound open, wound infection is prevented and the subcutaneous tissue is covered, resulting in reduced healing time. Healing is usually complete by 6weeks, and the recurrence rate has been reported to be 4-8%.

Many authors consider marsupialization the preferred method of treatment for chronic pilonidal disease because it avoids closure of a contaminated wound and combines shorter healing times with a lower recurrence rate. The patient still needs to pay meticulous attention to personal hygiene, with daily wound cleansing and frequent hair shaving and removal.



A & B Technique of marsupialization **C-Multiple sinus tracts**

D-During marsupialization E -After marsupialization F-5weeks later

Fig.-28 Excision with marsupialization

4. WIDE EXCISION AND PRIMARY DRAINAGE [10, 18, 83]

In this method, wide local excision is carried out around the pilonidal sinus and healing occurs by secondary intention which takes a longer time but has a lower recurrence rate. Mean hospital stay is about 4 weeks. The healing usually gets delayed by secondary infection by anaerobic bacteria.

Patients with recurrent pilonidal disease or complex unhealed pilonidal wounds present a challenge to the surgeon. Tissue loss from previous attempts at excision further complicates the surgical management and limits options. The causes of recurrence are thought to be due to

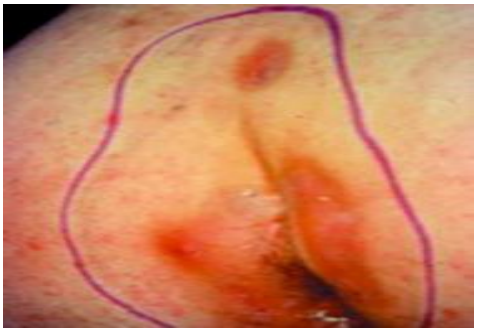
- Missed out sinus during initial excisional surgery
- Recurring infections leading to abscess

- Well known Midline cleft with inward and outward forces promoting hair to grow into the scar and cause recurrence.

- Most susceptible site for the recurrent pilonidal disease is the midline cleft with scar and due to poor wound healing.

- Generally a flap procedure will be required for the treatment of recurrent disease, wherein wide excision will be done and primary closure can be achieved with flap procedures and prevent the suture lines in the midline and the dead space is completely obliterated. Such techniques prevents the fricitional forces from causing the pilonidal sinus disease.

- Reserve the use of a flap closure for complex or recurrent pilonidal disease that has failed to respond to the simple conservative operative techniques initially used to treat chronic pilonidal disease. A wound that has failed initial therapy must be re-excised down to the sacro-coccygeal fascia. The re- excision must include the unhealed wound, scar and granulation tissue.



A-Plan for wide excision

B-2 weeks after wide excision

C-6 weeks post excision

D-10weeks post excision

Fig.-29 Wide excision

CLOSURE OF THE DEFECTS

Following wide excision, Primary wound closure is achieved by doing a Flap closure.

The following techniques are available

1. PRIMARY CLOSURE OF THE CLEFT
2. KARYADAKIS ADVANCEMENT FLAP PROCEDURE
3. ADVANCEMENT FLAP
    a. Z–PLASTY
    b. LIMBERG'S RHOMBOID FLAP
    c. V–Y ADVANCEMENT FLAP
    d. CROSSED TRIANGULAR FLAPS
4. GLUTEUS MAXIMUS MYOCUTANEOUS ROTATIONAL FLAP

1. CLEFT CLOSURE

Primary closure of the Cleft surgery was first devised by Bascom, in that the mobilization and excision of the fat is not needed.

Technique begins with excision of the wound by placing the apex of the incision lateral to the apex of the natal cleft and forming a triangular incision.

Full thickness skin flaps are raised.

Debris is removed and the sinus cavity is made free allowing the gluteal fat to appose . The inferior margin becomes crescent shaped, with its point positioned towards the anus.

A skin flap involving only the dermis is created on the convex side of the lower wound margin. Excess skin is excised from one side, and the wound is closed. This reshapes the cleft, making it shallower with the suture line displaced out of the fold.

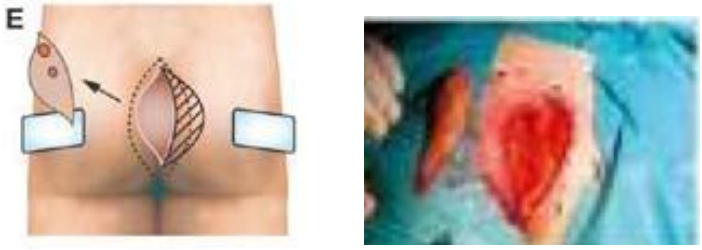
Before beginning the procedure, the lateral edge of the raised skin flap should be defined by marking the line of contact of the buttocks. Then the edges of the skin are overlapped, and the excess skin is excised. This creates a primary closure that is off midline and obliterates the intergluteal cleft. The wound is closed in multiple layers by keeping a closed suction drain underneath. The recurrence rate is reported to be 3.3%.

A – Pilonidal sinus

B – The natal cleft is approximated to mark the line of cleft closure

C – The area of cleft closure marked

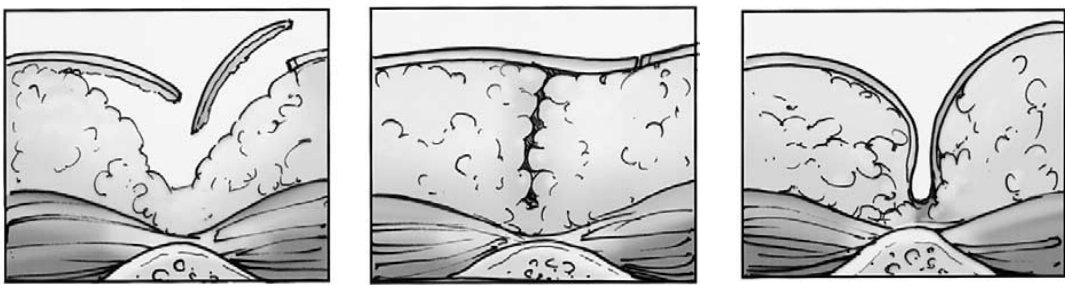
D – The area of sinus excision marked



E – The sinus tract excised and the incision extended and undermined to involve the site of cleft closure on one side.

F – The undermined flap is bought to suture to one side of the planned site of incision of cleft closure.

G – The subcutaneous tissue and the skin are approximated after placing drain.



H-Diagrammatic representation of cleft closure technique in the transverse view

I-6 months post operative picture of cleft closure

Fig.-30 Cleft closure procedure

2. KARYDAKI'S LOCAL ADVANCEMENT FLAP [10, 18, 20, 32, 65]

The Karyadakis advancement flap procedure starts with excision of the wound with en bloc removal of the sinus with an elliptical overlying skin specimen. The incision will be made off Midline.

After excision of the wound, a full thickness flap is raised on the contralateral side of the semilateral incision which allows the contralateral side of the skin to be mobilized to cross the midline and thereby allowing primary wound closure, avoiding midline closure. The midline sinus is excised elliptically and the wound closed lateral to the midline.

ADVANTAGE :

The natal cleft will be flattened

The suture line will be in a lateral position but not in the midline.

DISADVANTAGE:

Has a 1.3% recurrence rate

Requires extensive dissection and so cannot be done as OPD procedure.

PROCEDURE :

Thick flap created and advanced across the midline and primary closure done. Wound is closed in several layers after keeping the suction drain underneath.

Karyadakis local advancement flap technique is considered as a primary procedure for pilonidal sinus.

Fig-31 Karydaki's flap

ADVANCEMENT FLAPS

The various types of Local advancement flaps are

- Z–plasty
- Rhomboid flap
- V-Y advancement flap

These are indeed methods of covering defects which results from recurrent pilonidal disease.

ALTERNATIVES:

So Because of the above mentioned disadvantages, whenever an advancement flap is needed, myocutaneous flap should be considered.

- Myocutaneous flaps helps to reconstruct Complex wounds as these flaps heal well and helps to cover large area of skin loss.
- They are less susceptible to infection
- They have a predictable vascular supply that promotes better wound healing.

DISADVANTAGES:

- Technically demanding techniques
- Recurrence rates range from 6 to 20%

- Prolonged hospitalization
- Lengthier operating time
- Failed flap is another great problem, which creates a additional extensive skin loss which is difficult to manage.

So these techniques are only reserved for the Management of Complex Recurrent Wounds where other procedures have failed.

3. Z–PLASTY [18, 32, 75]

PRINCIPLE :

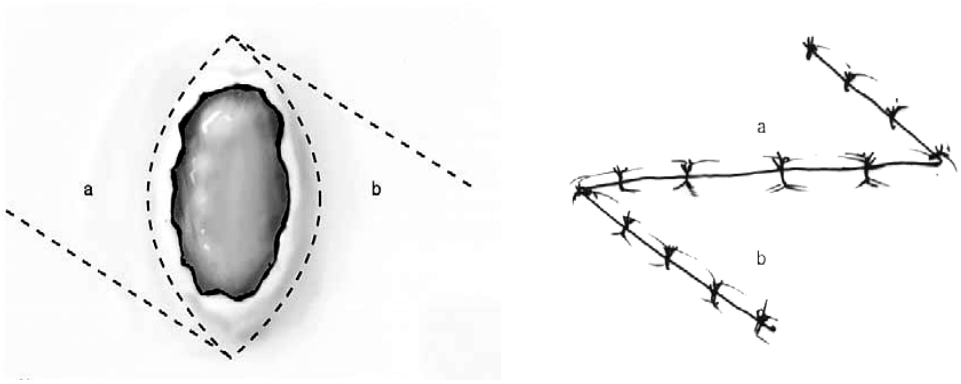
Obliterating the natal cleft and increasing the transverse length by recruiting the lateral tissue.

PROCEDURE :

- Excision of the midline sinus
- From the ends of the midline wound, the limbs of the "Z" are cut
- Subcutaneous flaps are raised upto the level of fascia
- Transposition of the flaps carried out
- Skin is closed.

Mansoory and Dickson used this technique on 120 patients and reported a complication rate of 4 % and a recurrence rate of 1.65% after a

follow up of 9years. The patients were discharged on post operative day 1 and they returned to work 2 weeks later.



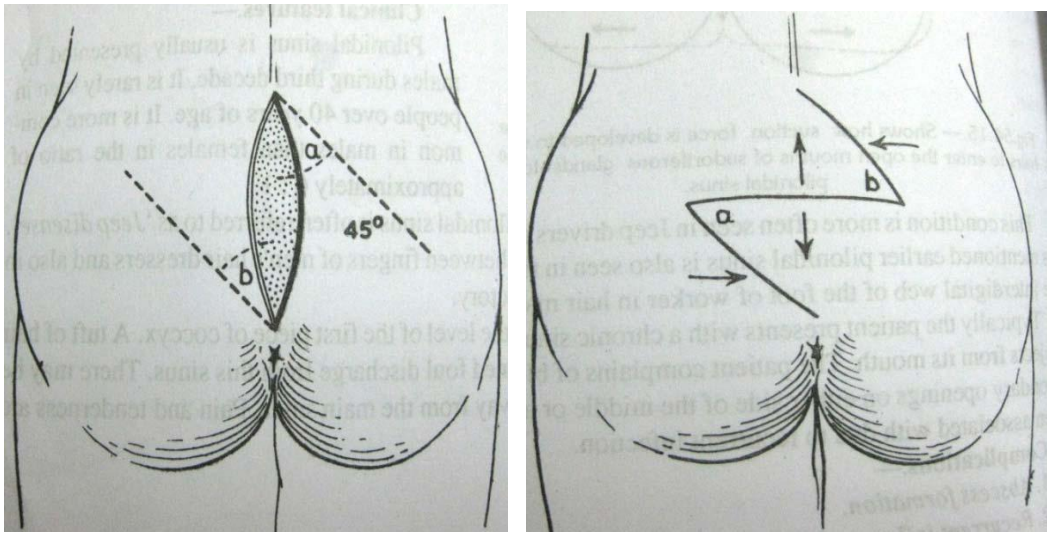


Fig-32 Z-plasty

a. marking of Z limbs A and C

b. Flaps created and transposition done and skin closed B and D

4. V-Y ADVANCEMENT FLAP [18, 20, 76]

The V-Y advancement flaps can be raised unilaterally or bilaterally.

- Unilateral flap will cover a defect 8-10cms in diameter.
- Bilateral flaps cover defects greater than 10cm.
- The flaps are raised upto the level of fascia and thereby composed of skin, fat and underlying gluteal fascia.

ADVANTAGES:

- Closure of the primary area can be achieved without tension
- Dead space can be obliterated easily
- Complete removal of all midline pits and necrotic tissue can be achieved.
- Mean hospital stay was around 10 days
- Wound complication occurs at a rate of 8% and 17% for unilateral and bilateral flaps respectively
- Long time recurrence rate of 5% after a follow up of 5 years.

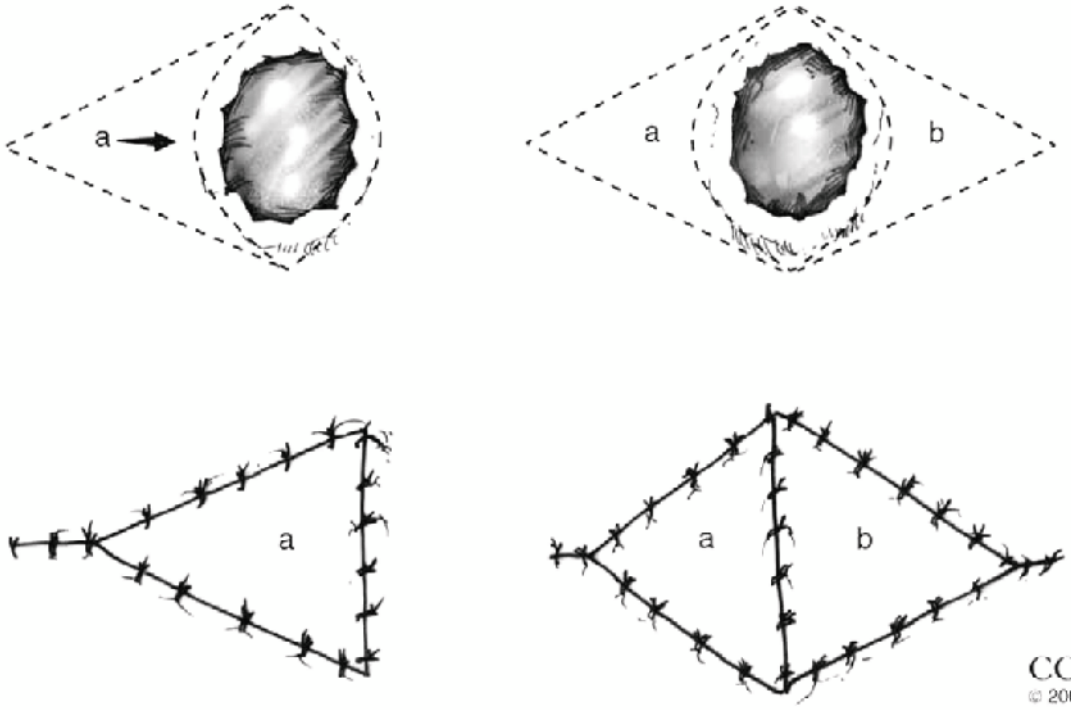


Fig.-33 V-Y advancement flap.

Fig 1 and 3 – Unilateral advancement flaps

Fig 2 and 4 – bilateral advancement flap

Technique : Flap extended in a V fashion from the wound as marked by a. This is then advanced into the wound and secured. The resulting suture lines resemble a Y on its side because the area of harvest is re-approximated to simulate the stem of the Y.

5. CROSSED TRIANGULAR FLAPS [60]

ADVANTAGES :

- Easy technique
- Early return to work and lesser hospital stay
- Cosmetically acceptable appearance postoperatively.
- Wound complication rate of 5%
- Recurrence rate 1.73%

PROCEDURE :

- A semicircular midline incision is made including all the sinus openings and excision of the sinus tracts are done.
- Zig zag incision across the wound in done to form multiple triangles, with apical part on one side of the wound and basal part on the other side.
- All apical parts of each triangle are excised, basal parts undermine, and haemostasis achieved.
- The wound is closed in a zigzag line, with the basal flaps crossing the midline to replace the apical parts.

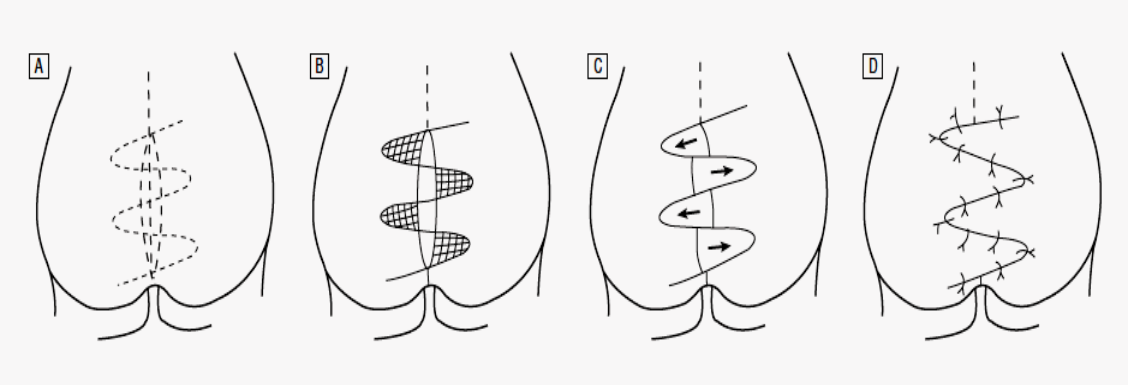


Fig-34 Diagram of crossed triangular flaps technique.

Fig A shows the vertical and zig zag incision

B shows formation of triangular flaps resulting from zig zag incision

C Apical parts excised and basal parts undermined to replace the excised apical part

D wound closure


A- Marking for vertical and zig zag incision
B-Excision of pilonidal sinus tissues


C Zigzag incision done to produce triangular flaps

D Excision of all apical parts


E-Basal parts are undermined
F-Wound and natal cleft 1.5 years with closure of the wound postoperatively.

Fig-35 Crossed triangular flaps

6. LIMBERG'S RHOMBOID FLAP [18, 63, 70, 71]

ADVANTAGES:

- Used to cover large defects
- Least likely to necrose as it is a well vascularized flap
- Flattens the gluteal cleft
- Closure can be achieved without tension
- Mean hospital stay is 6 days
- Recurrence rate is 4% following a follow up period of 74 months.

PROCEDURE :

- Rhomboid incision made around the pilonidal sinus and excision of all the existing sinuses down upto the presacral fascia carried out.
- Incision enclosed rhombic area of skin, subcutaneous fat and sinuses excised along with lateral extensions.
- Long axis of the rhomboid is in midline and the short axis is transversely placed.

MEASUREMENTS:

Rhomboid:-

Line A-C drawn.

Point C adjacent to the perineal skin.

Point A placed so that all diseased tissue can be included in the excision.

Line B-D transects the mid-point of A-C at right angles and is 60% of its length.

D-E is a direct continuation of line B-D and is of equal length to the incision B-A, to which it will be sutured after rotation.

E-F is parallel to D-C and of equal length.

After rotation it will be sutured to A-D.

- Flap consists of skin and fat and is constructed by extending the incision to the gluteal muscle fascia. The skin is approximated after insertion of a vacuum drain.

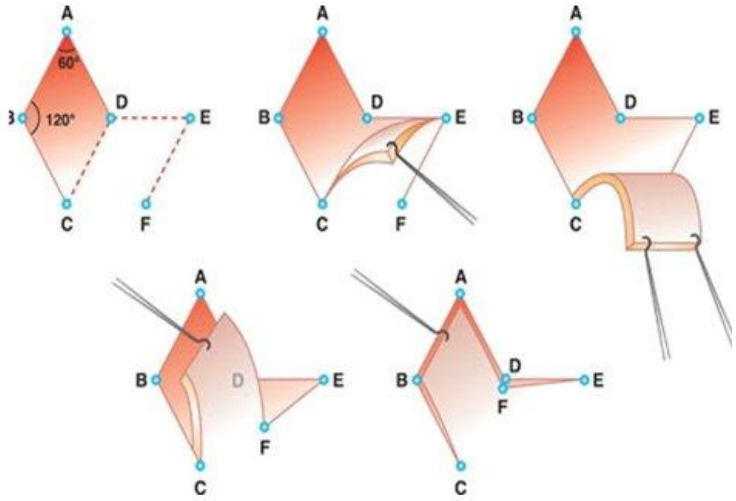
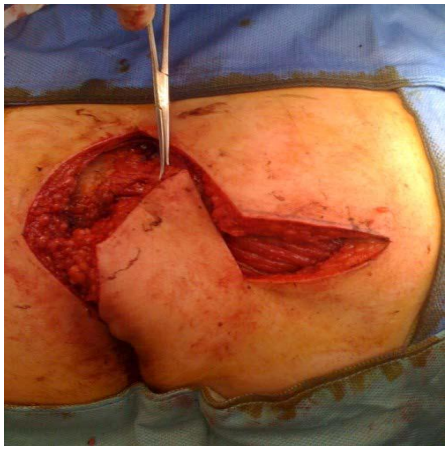
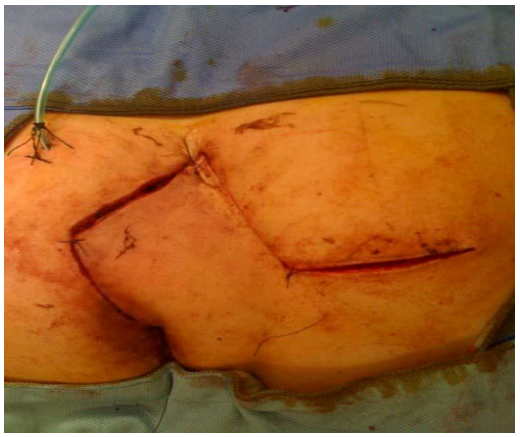


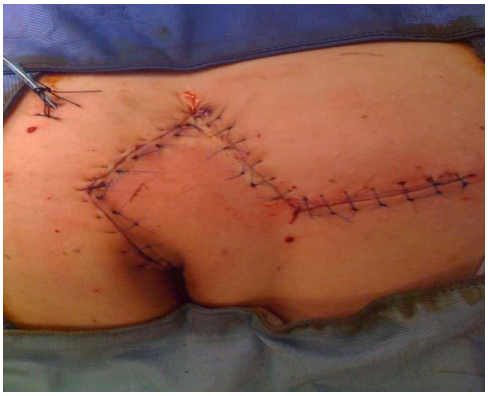
Fig.-36 Diagrammatic representation of the Limberg flap

A-Plan for excision and incision of flap B-Excised specimen with incision over the flap





C-Rotation of flap to cover the defect D-Flap in place with drain



E-Final appearance of wound after flap closure

F-Operated site at the end of 6months

Fig-37 Limberg Flap

7. GLUTEUS MAXIMUS MYOCUTANEOUS FLAP [18, 79]

The gluteus maximus myocutaneous flap is an example of a rotational flap which consists of creation of large rotational flap.

ADVANTAGES:

With the gluteus maximum myocutaneous flap in hand, radical excision of all diseased tissue can be done and the dead space can be filled with bulky well vascularized and compliant tissue.

Very Large defects can be closed with gluteus maximus myocutaneous flaps.

It obliterates the natal cleft thereby eliminating the local anatomical factors responsible for the formation of pilonidal sinus.

No tension will be created between the suture lines.

DISADVANTAGES :

Morbid procedure required longer duration for surgery

Require lengthier hospital stay with 2 weeks being the average hospital stay and total time off work is 2 months.

Wound dehiscence common.

So, therefore not recommended unless other measures failed.

Fig.-38 The gluteus maximus musculocutaneous flap

USE OF DRAINS

It is important to know from what the literature says about what kind of drains are used after any procedure for the pilonidal sinus. So from a Prospective Randomized study on the Usage of Suction drains in the patients treated with Limberg flap, it was found that early wound complication rate was 7.5% and recurrence rate was 2.5% for both groups.

And the important thing to be noted is that the only difference was being the lengthier hospital stay in the patients in whom drainage tubes were kept postoperatively. Atlast, they concluded that drainage was not necessary.

Regarding the Usage of drain tubes, Penrose drain was kept at the upper end of the wound for two or three days by Karydakis. Akinci and his associates modified karydakis drain by the usage of suction drain. With the usage of suction drains, the incidence of postoperative complications like hematomas and seromas have been reduced to zero. Literature shows successful closures have been obtained with the use of suction drains with Karydakis procedure, Rhomboid flap and Limberg flap techniques and some other have successful outcomes without the usage of drain tubes.

In a Nutshell, the incidence of collections under the flaps have been decreased with the usage of suction drains. However, the definitive answer cannot be derived from the current literature.

MATERIALS AND METHODS

SOURCE OF DATA:

The material for the present study was collected from the patients who presented with discharge with/without swelling and with/without pain in the gluteal region.

SAMPLE SIZE:

Sample size of minimum of 50 patients fulfilling the inclusion criteria were part of this study.

METHOD OF COLLECTION OF DATA:

Detailed history taking Complete clinical examination Investigations Performing surgery for the cases, noting the findings and follow up of the histopathology reports.

The details of the above have been given in the clinical proforma sheet and in the master chart.

INCLUSION CRITERIA:

Patients aged between 20 to 40yrs.

Includes both males and females.

EXCLUSION CRITERIA:

Doesn't include pregnant women.

Osteomyelitis of the underlying bone

Fistula in ano

Perianal abscess

Sebaceous cyst

Dermoid cyst

Hydradinitis

Tubercular and Syphilitic granuloma

ROUTINE INVESTIGATIONS:

Hemoglobin percentage

Total leukocyte count Differential count

Erythrocyte sedimentation rate

Bleeding time

Clotting time

Urine for protein, sugar and microscopy

Random blood sugar

Blood urea, serum creatinine

SPECIFIC INVESTIGATIONS:

Pus for culture and sensitivity Chest radiograph Electrocardiograph

X-ray lateral view of the lumbo–sacral spine

TREATMENT:

CONSERVATIVE TREATMENT:

All patients were advised personal hygiene and local hair epilation. Patients presenting with pilonidal abscess were treated with incision and drainage initially as an out-patient procedure and appropriate antibiotics and rest given and then subjected for definitive procedure once the infection and edema subsided.

SURGICAL PROCEDURE:

Depending up on the patient's choice; the following surgical procedures were performed:

Limberg flap.

Marsupialization.

Wide excision with primary closure.

DATA ANALYSIS

The postoperative course was noted & complications were attended to & reated accordingly.Patients were followed up for a further period of 6months. Final outcome was evaluated.

All the clinical data of each patient was recorded in the pre-coded clinical proforma designed for the study.

Important data pertaining to the each case is shown in the master chart & the results are statistically analyzed and compared with known previous studies as per the following parameters:

Age incidence

Sex incidence

Occupational incidence

Mode of presentation

Incidence with regard to B.M.I.

Findings on examination

Organisms cultured

Procedure done

Complication rate.

Ethical clearance was taken from our institute for the study.

RESULTS

Pilonidal sinus is one of the least reported of diseases prevalent. Patients tend to seek advice mostly only when they are ridden with the complications of the disease and/or have a persisting disturbing discharging sinus. The patients presented to the doctor with complaints were only tip of the ice berg .Not many studies have been conducted in India to know the prevalence and incidence of the disease. Many go unreported and under diagnosed or even misdiagnosed. A total of 50patients were admitted with complaints relating to pilonidal disease and its complications. The above patients were included in the study; findings noted, appropriate treatment instituted and followed up for a period of 6months.

SEX INCIDENCE

The Indian male for obvious reasons like more hair distribution and occupation were noted to be more prone for the disease than the female counterpart. The male: female ratio was noted to be approximately 5:1.

Table-1 Sex Incidence

Gender	Number of Patients	Percentage (%)
Males	42	84
Females	8	16
Total	50	100

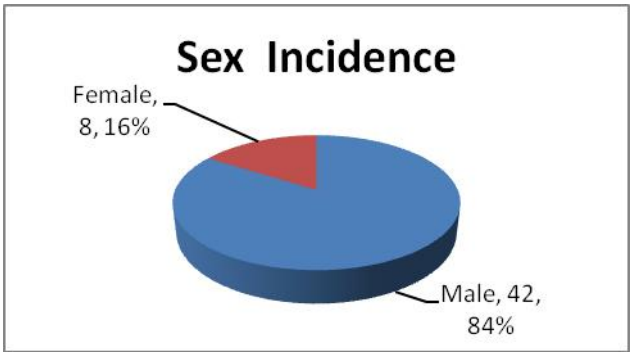


Table-1 a Sex Incidence Comparison

Study	Present Study	Sheeraj Shakoor et al.	Oner Mentes et al.
Male	42 (84 %)	24(75 %)	335(94.1 %)
Female	8 (16 %)	8(25 %)	18(5.1 %)
Male : Female	5 : 1	3 : 1	19 : 1

After comparison with known previous studies, it can be concluded that the incidence of pilonidal disease is more common in men. It is also noted that the incidence of this disease is more common in the female gender in the south east Asia compared to the western study.

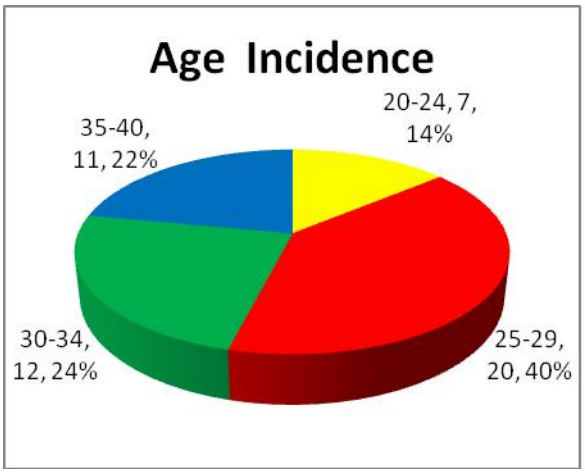
AGE INCIDENCE

Pilonidal disease commonly affects the young people. It is not seen in the older age groups unless the cause has been because of poor previous treatment.

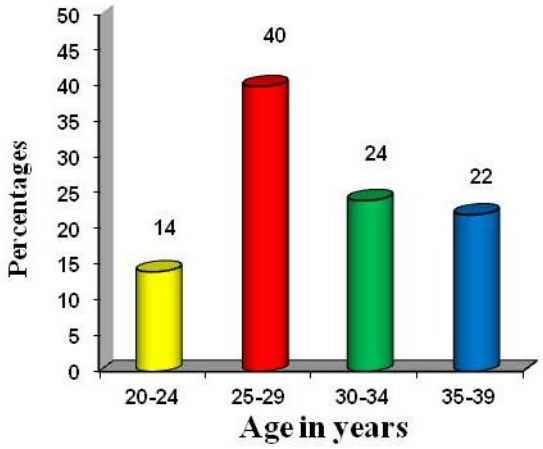
Table-2 Age Incidence

Age Group (in years)	Number of Patients	Percentage (%)
20-24	7	14
25-29	20	40
30-34	12	24
35-40	11	22
Total	50	100

Mean ± SD: 29.48±5.12



Graph-2



Graph-3

Table-2.a Age Incidence Comparison

Age	Present Study	Oner Mentes et al	Baki Eaci et al
Mean ± SD	29.48 ± 5.12 yrs	24.65 ± 4.2 yrs	25.6 ± 6.3 yrs
Range	20 – 39	18.95 – 32.16	18 – 38

As noted in the comparative study, the mean age of presentation of pilonidal disease is in the mid twenties in the western studies, but it is noted to be in the late twenties in the present study. It is also noted that the range of presentation remains the same in all studies thus proving that presentation is rare after the age of 40 yrs.

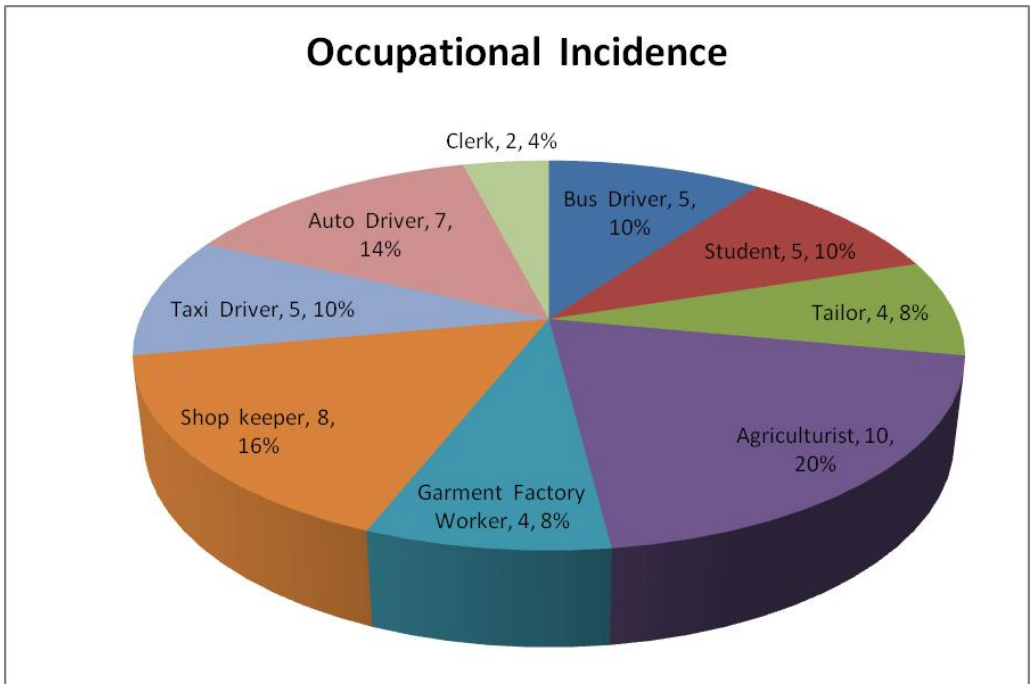
OCCUPATION INCIDENCE

Occupation has a role in the development of pilonidal disease. During the World War-II, it was found to be common among jeep driver, hence the name "*Jeep bottom"*. It seen in people who have a work pertaining to prolonged duration of sitting and close to vibrating surfaces.

Table-3 Occupational Incidence

Occupation	Number of Patients	Percentage (%)
Bus driver	5	10
Student	5	10
Tailor	4	8
Agriculturist	10	20
Garment factory worker	4	4
Shop keeper	8	16
Taxi driver	5	10
Auto driver	7	14
Clerk	2	4
Total	50	100

Graph-4



Though called *"Jeep Bottom"* as it was noted to be more common in the jeep drivers of the World War-II, there have been no definitive studies done to note that the disease is more common in patients who have history of prolonged sitting and those who are close to vibrating structures.

CLINICAL PRESENTATION

Table-4 Clinical presentation

Symptoms	Number of Patients	Percentage (%)
Swelling	36	72
Discharge	13	26
Pain	46	92
Past interventions	45	90

Most patients presented with complain of pain in the gluteal region. The patients who had presented with an abscess had pain, swelling and discharge.

Most patients in the present study had some form of intervention in the past hence presented with recurrent pilonidal sinus or its complications.

Graph-5

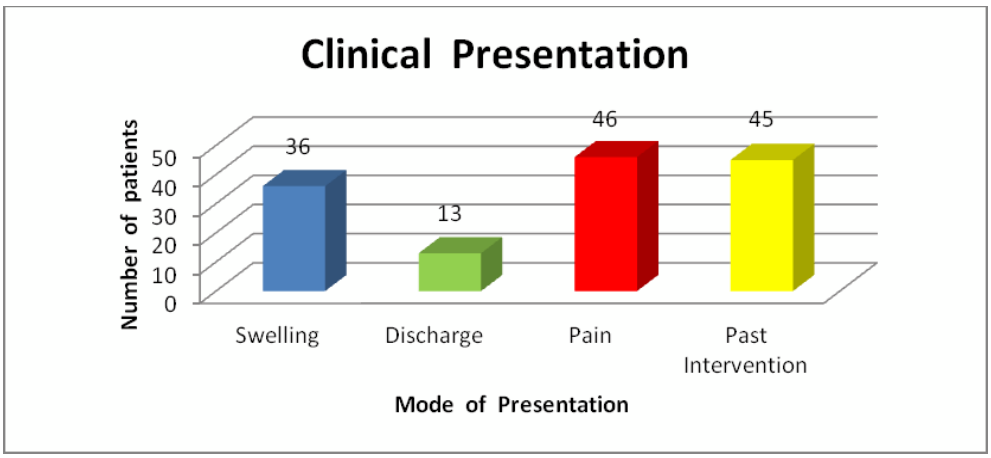


Table-4 a Clinical Presentation Comparison

Symptom	Present Study	Oner Mentes et$_{al.}$[70]	Sondenaa et al.[54]
Swelling	36 (72 %)	70 %	50%
Discharge	13 (26 %)	20 %	66%
Pain	46 (92 %)	70 %	35%
Past Intervention	45 (90 %)	11 %	38%

In the studies it is noted that the most common complaint with which the patient presents is pain and swelling. The pain is a vague dull pain that interferes with the work. However, there are patients who have presented with complaints of persistent discharge. However, it is noted that patients in the west seek early definitive surgical intervention for their disease compared to the present study group. Hence, the high rates of previous interventions in the study group.

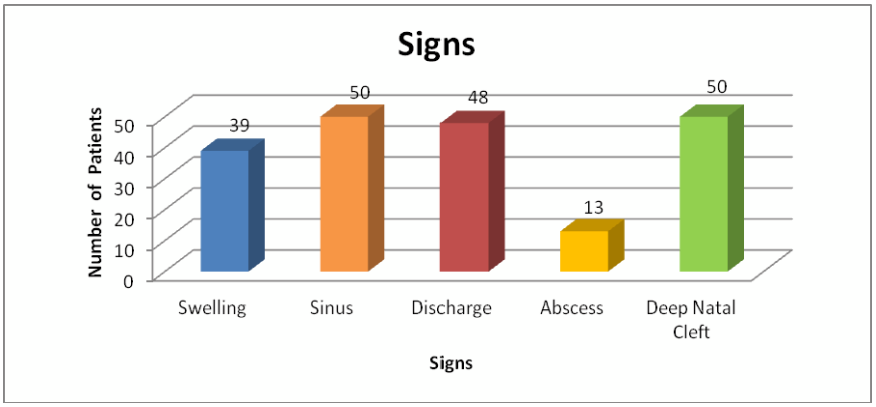
EXAMINATION FINDINGS

Table-5 Examination findings

Signs	Number of Patients	Percentage (%)
Swelling	39	78
Sinus	50	100
Discharge	48	96
Abscess	13	26
Deep Natal Cleft	50	100

All patients who presented had pilonidal sinus. All patients had a deep cleft. Most patients had history of discharge from the sinus. And it was only a few patients who presented with history of swelling. But the patients who presented with all the three had an abscess which required immediate intervention.

Graph-6 Examination findings



Studies done by Bascom and Alan Klass definitely state that this disease is common in hirsute males with a deep natal cleft and that the presence of sinus (single and/or multiple) is almost a constant feature of all patients who presented with pilonidal disease.

BODY MASS INDEX

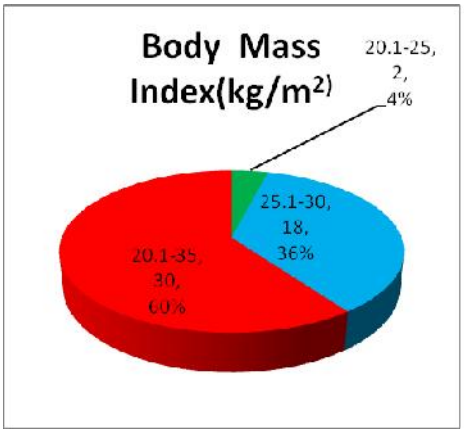
There have been numerous studies that have proved the incidence of increased body mass index with the incidence and even recurrence of pilonidal sinus.

Table-6 Body mass index

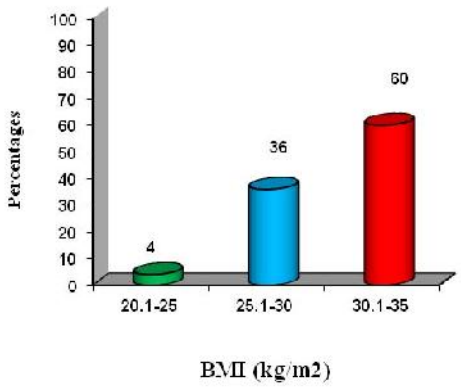
Body Mass Index	Number of Patients	Percentage (%)
20.1 – 25	2	4
25.1 – 30	18	36
30.1 – 35	30	60
Total	50	100

Mean ± SD: 30.27±2.53

Graph-7



Graph-8



Tle-6 a Body Mass Index Comparison

B.M.I.	Present Study	Oner Mentes et al.[70]
20.1-25	2(4%)	65.1%
25.1-30	18 (36%)	30.3%
30.1-35	30 (60%)	4.6 %
Mean ± SD	30.27 ± 2.53 kg/m^2	22.58 ± 2.64 kg/m^2
Range	23.5 – 33.9 kg/m^2	18.95–32.16 kg/m^2

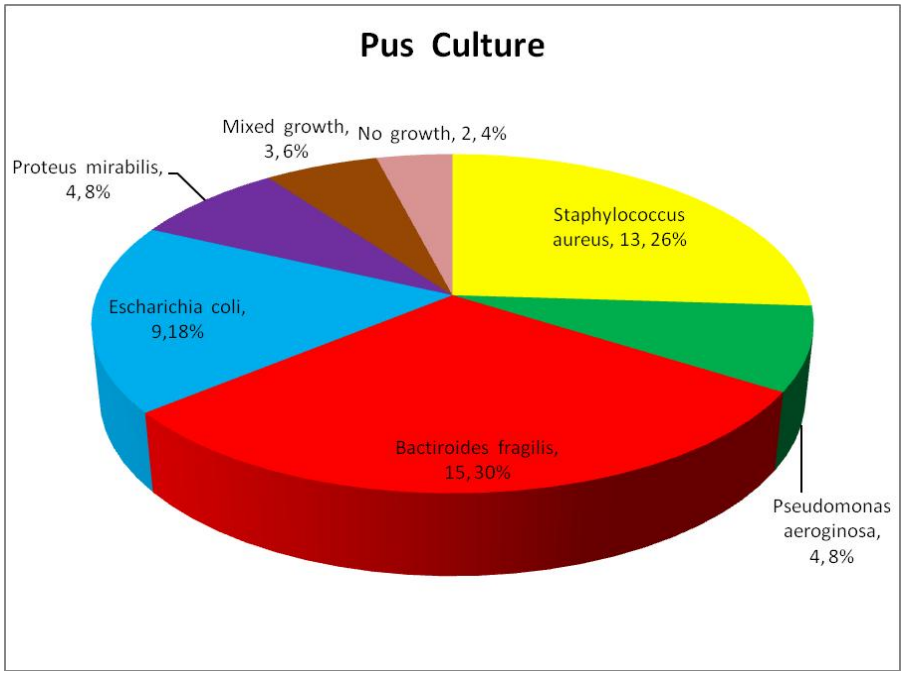
PUS FOR CULTURE SENSITIVITY

Most patients who had presented had either complaints of discharge or had presence of discharge on examination. Hence as a prophylactic measure all the patients pre-operatively had undergone pus for culture sensitivity test and appropriate antibiotics were instituted. This is a chart to note the organisms isolated from the site of sinus and its comparative analysis.

Table-7 Pus Culture Report

Organism	Number of Patients	Percentage (%)
Staphylococcus aureus	13	26
Pseudomonas aeroginosa	4	8
Bacteroides fragilis	15	30
Escherichia coli	9	18
Proteus mirabilis	4	8
Mixed growth	3	6
No growth	2	4
Total	50	100

Graph-9



Graph-10

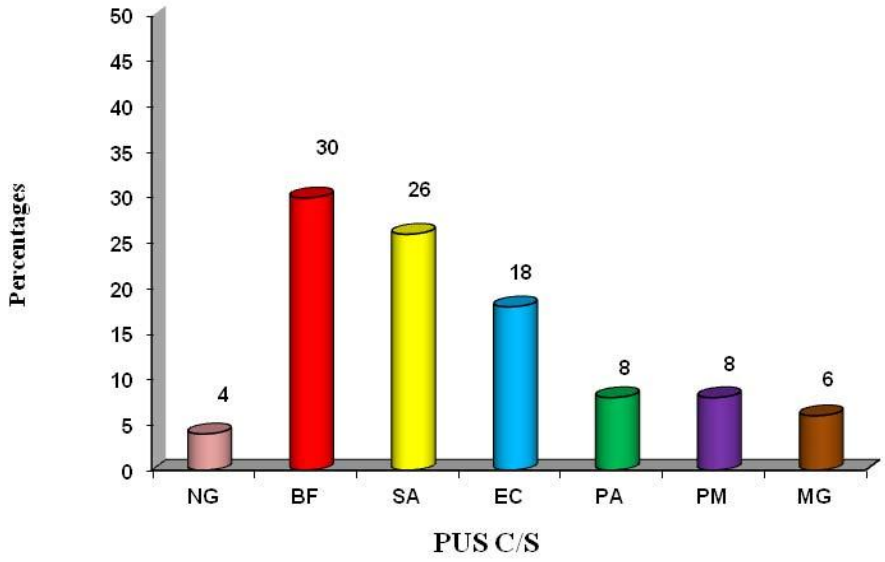


Table-7 a Pus Culture Comparison

Organism	Present Study	S.Chintapatla et al. [10]
Aerobic Organisms	17 (34%)	4%
Anaerobic Organisms	28 (56%)	77%
Mixed growth	3 (6%)	17%
No growth	2 (4%)	-

From the above comparative analysis, it can be concluded that the most common organisms found in the pilonidal sinus are the anaerobic organisms. Occasionally, there is a mixed growth obtained.

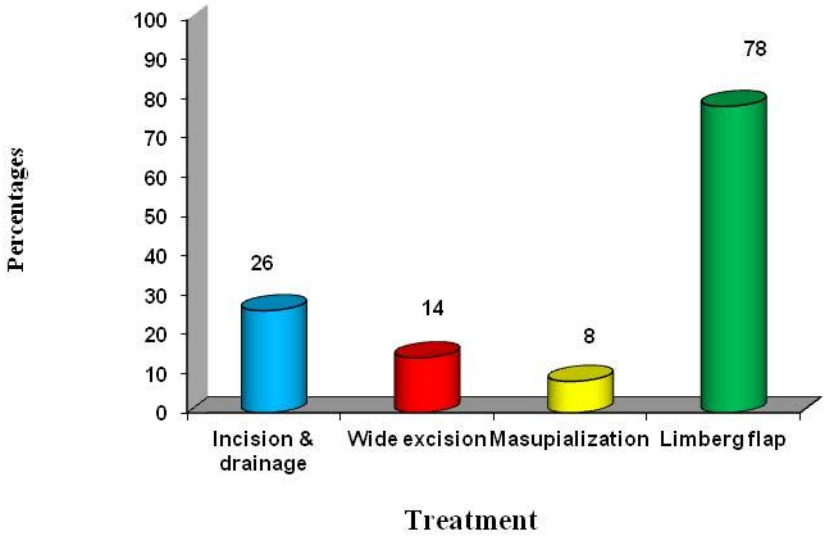
PROCEDURE

The patients who had presented with complaints of abscess were drained on an emergency basis. The other patients who presented with complaints of recurrent or chronic disease were subjected to the operative procedures.

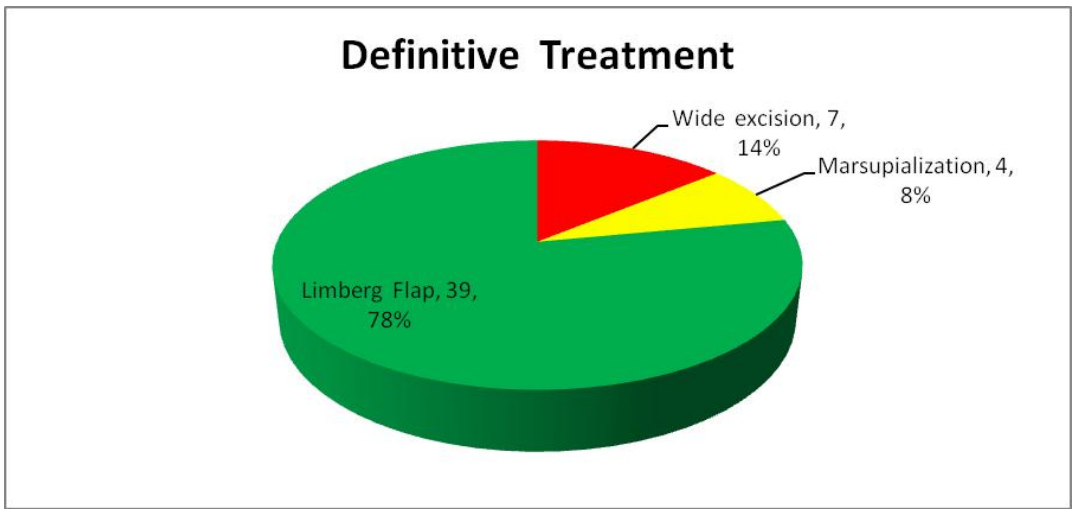
Table-8 Procedure

Treatment	Number of patients	Percentage (%)
Incision and Drainage	13	26
Wide Excision primary closure	7	14
Marsupialization	4	8
Limberg Flap	39	78

Graph-11 Procedure performed



Graph-12



INCIDENCE OF COMPLICATIONS

The most common complications encountered in this study were:

- Wound infection which was common to all the three procedures performed.
- Wound dehiscence was there in the patients undergoing primay closure and Limberg flap procedure.
- Collection which was noted to be only in patients undergoing Limberg flap study.

Table-9 a Incidence of wound infection

Wound Infection	Number of patients	Percentage (%)
Yes	6	12.0
No	44	88.0
Total	50	100

Graph-13

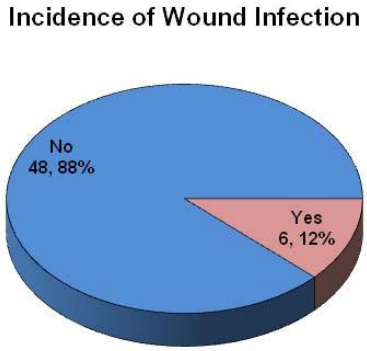


Table-9 b Incidence of wound dehiscence

Wound Dehiscence	Number of patients	Percentage (%)
Yes	2	4.0
No	48	96.0
Total	50	100

Graph-14

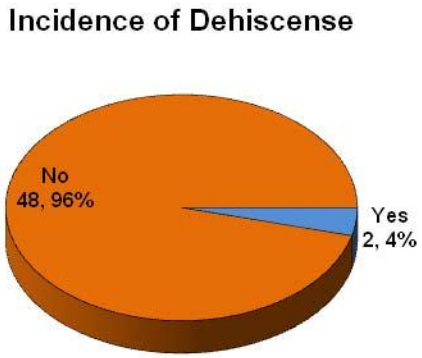


Table-9.c Incidence of Collection

Collection	Number of patients	Percentage (%)
Yes	4	8.0
No	46	92.0
Total	50	100

Graph-15

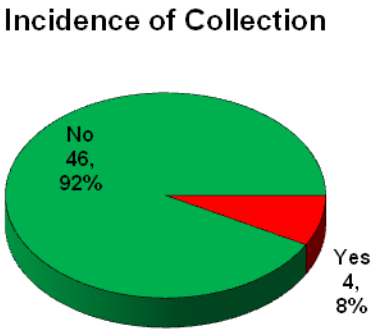


Table-9.d Incidence of complications per procedure performed

Procedure	Number of patients	Complications	Percentage (%)
Wide Excision primary closure	7	2	28.57
Marsupialization	4	-	-
Limberg Flap	39	10	25.64

Table-9.e Incidence of complications-Comparison

Procedure	Our study	Akmal Jamal et al.[86]	T. L. Hull et al.[18]
Wide Excision primary closure	28.57 %	28 %	-
Marsupialization	-	-	2.4 %
Limberg Flap	25.64 %	8.33 %	-

The above comparative studies clearly state that, the said procedures have their own rates of complication. And they have been noted to be minimal in Marsupialization.

RATE OF RECURRENCE

This has been divided into:

Incidence of recurrence in the study per say.

Incidence of recurrence per procedure performed.

Table-10.a Incidence of Recurrence

Recurrence	Number of patients	Percentage (%)
Yes	4	8.0
No	46	92.0
Total	50	100

Graph-17 Incidence of Recurrence

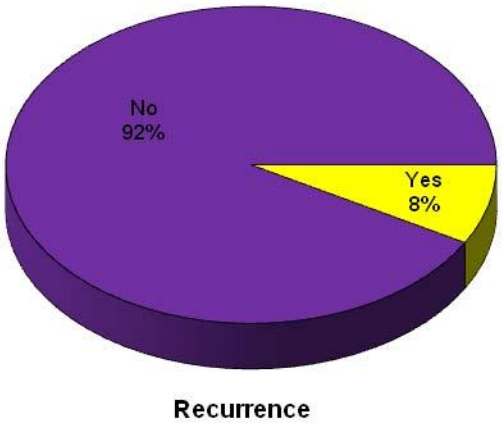


Table-10.b Incidence of recurrence per procedure performed

Procedure	Number of patients	Recurrence	Percentage (%)
Wide Excision primary closure	7	2	28.57
Marsupialization	4	0	0
Limberg Flap	39	2	5.13
Total	50	5	10

Graph-18 Incidence of Recurrence per procedure performed

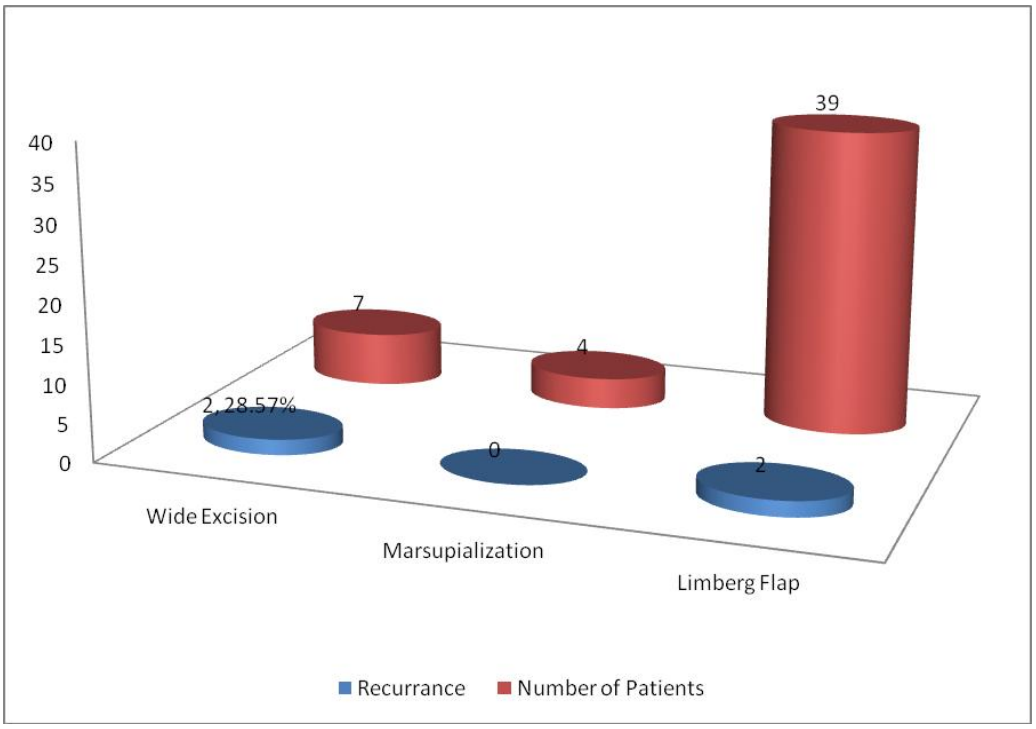


Table-10. C Rate of Recurrence Comparison

Procedure	Our Study	Akmal Jamal et al.[86]	T. J. Hull et al. [18]
Wide Excision primary closure	28.57 %	28 %	-
Marsupialization	25 %	-	4 %
Limberg Flap	5.13 %	4.18	5 %

The duration of hospital stay, time taken for healing and time taken to return to work are important variables which decide the success of the treatment for pilonidal disease. As already mentioned, this disease causes morbidity amounting to loss of work and discomfort hence these determinants help choose the appropriate line of management.

Table-11 Duration of Hospital Stay

Procedure	Our Study	Akmal Jamal et al. [86]	T. J .Hull et al.[18]
Wide Excision primary closure	14.57 ± 2.2 days	5.68 ± 1.25 days	-
Marsupialization	16 ± 4.95 days	-	3 ± 1.3 days
Limberg Flap	4.51 ± 2.28 days	4.04 ± 1.12 days	-

Table-12 Time Taken For Complete Healing of Wound

Procedure	Our Study	Akmal Jamal et al. [86]	T. J. Hull et al. [18]
Wide Excision primary closure	53.57 ± 15.57 days	120.08 ± 31.59 days	-
Marsupialization	32.37 ± 3.35 days	-	3 – 5 weeks
Limberg Flap	11.23 ± 3.86 days	20.13 ± 8.99 days	-

DISCUSSION

Pilonidal Sinus Disease has become a common disease affecting the young. It is under reported and yet it does significantly cause discomfort and morbidity to the patients that draws them to the surgeons-mostly when complications of the disease arise. Definitive treatment is best provided when the patient initially presents to the surgeon to prevent loss of time from work and distress to the patient.

SEX INCIDENCE

The disease is more common in males for reasons like hirsutism, distribution of hair and occupation. The western literature also confirms that this disease is predominant in males.

AGE INCIDENCE

The disease doesn't occur in subjects beyond 40years for reasons that have already been explained. It is more commonly seen in the late teens and early twenties as the hormone levels are high in this age. Females tend to develop this disease at an earlier age than the male counterparts due to early onset of maturity. The mean age at presentation in our study is 29years. But the western literature shows an earlier age at presentation of 24 years. This depicts better knowledge about the disease and early definitive treatment at an earlier stage.

OCCUPATION INCIDENCE

"Jeep Bottom" as it's also called is more common in subjects that sit for prolonged amounts of time and in those who work close to vibration machinery. Our study reflects this entity.

CLINICAL PRESENTATION

It is seen that the most common complaints that the patient may present with are pain, swelling and discharge. There may be persistent embarrassing discharge or vague dull aching pain that causes discomfort. Patients often complain of intermittent swelling that reduces spontaneously after bursting open to discharge foul smelling thick paste like material associated with hairs. Patients who have presented with complaints of abscess had all the complaints of pain, swelling and discharge with exaggeration of all symptoms worsening over a short duration of time. Pilonidal sinus is a disease that has high rates of recurrence. And hence patients present with failure of previous treatment and recurrent trials of treatment in the past till proper definitive surgery has been advocated. Our study and the other studies that have been taken for comparison prove this.

CLINICAL FINDINGS

All the patients who presented had presence of sinus (single/multiple) in the natal cleft and they also had presence of a deep natal cleft. 78% of patients had local swelling and 96% of patients had active discharge seen coming out of the sinuses. About 26% of patients had complaints with abscess-pain, swelling, discharge, tachycardia, local raise of temperature and tenderness.

BODY MASS INDEX

Every study done on pilonidal sinus mentions the significance of body mass index on the incidence and the rate of recurrence of pilonidal disease. It is noted to be more common in patients who have a high body mass index. In this study, the average body mass index noted is 30.27 kg/m^2 while the average body mass index noted in western literature is 22.86 kg/m^2. However in a study done by Cubukcu, the incidence of recurrence and complications are significantly higher in patients who presented with a higher body mass index. [62]

INVESTIGATIONS

Diagnosis of pilonidal disease is mostly clinical; there are no specific investigations that are needed for the confirmation of its diagnosis. However, in patients presenting with discharge, the discharge was sent for culture and sensitivity and appropriate antibiotic treatment was instituted. The most common organisms that were isolated were the anaerobic organisms , mixed growth was noted in a few and 4% of patients had a negative culture. These findings are similar to the western study that has a detailed evaluation organisms cultured in pilonidal disease. All the patients had undergone x ray lateral view of the lumbo-sacral region, and there was no radiological abnormality noted.

TREATMENT

The common treatment that was advised to all a patients was good personal hygiene and shaving of local area. All the patients who were admitted with complaints of pilonidal abscess, underwent an emergency incision and drainage procedure done under local anesthesia and started on broad spectrum antibiotics. They are dressed on alternate day basis till the inflammation and oedema had reduced and then they were advised definitive surgery like wide excision with primary closure ,

marsupialization and Limberg flap. 8% of patients had undergone marsupialization, 78% of patients had undergone Limberg flap procedure and the rest wide excision with primary closure and healing by secondary intention. The patients who had undergone Limberg flap procedure had drains placed to prevent collection underneath the flap. The drains were removed when the collection in the drain was noted to be below 20ml and 2 patients did not require drain placement.

COMPLICATIONS

The most common complications that were noted were infection and in flap procedure there was wound dehiscence and collection under the flap. The infection was treated with appropriate antibiotics and dressings and allowed to heal by secondary intention. Of the 2 patients who did not require drain, one had developed collection (sterile) which was drained and the site healed by secondary intention. One patient who underwent Limberg flap had wound infection and partial wound dehiscence of the lower flap which was treated by antibiotics and daily dressings and it ultimately healed by secondary intention over time. The rate of incidence of complications is noted to be higher in the flap group as it's a complex procedure. The incidence of complications noted were

found to be similar in the present study and in the western literature in patients who underwent wide excision. No complications were noted in the present study in patients undergoing marsupialization, however western literature reports complication rate of 2.4 %.The incidence of complications in the western literature for Limberg flap is 8.33% and in the present study are 25.64% which is significantly higher.

RECURRENCE

Of the procedures performed, all the procedures had variable rates of recurrence. In comparison with western literature, it is noted that the results are similar in patients undergoing wide excision. While the results are very highly significant in patients undergoing marsupialization, with the present study showing no recurrence rates and western literature shows a recurrence rate of 4 %. In patients undergoing Limberg flap, our study shows a recurrence rate of 5.13 % while western literature shows a recurrence rate of 4.18 %.

DURATION OF HOSPITAL STAY

Our study shows the hospital stay duration found to be very less in patients treated with flap procedures than who underwent other procedures. Similar results were obtained from all studies done so far.

TIME TAKEN TO HEAL

The total time taken for the wound/flap to heal was noted to be significantly lower in patients undergoing Limberg flap procedure. This correlates with western studies that prove that the average time taken for wide excision wound to heal is about 53.57±15.57days in the present study while in the western literature it is 120.08±31.59days. In patients undergoing marsupialization, the healing time noted in western literature was 3-5 weeks while in the present study it is noted to be 4–5weeks. In patients undergoing Limberg flap procedure, the healing time noted in the present study is 11.23±3.86 days. While in western literature it noted to be 20.13±8.99 days.

CONCLUSION

- In our study of 50 patients who presented with various presentations of pilonidal disease the following observations were made:
- Pilonidal disease is a disease of the natal cleft affecting young adults with a male preponderance and occupation involving prolonged sitting.
- The modes of presentation vary from painful discharging sinus to acute abscess.
- It is more common in patients with high body mass index and deep natal cleft.
- It's a diagnosis based on clinical findings.
- Anaerobic infection is more common in the sinus.
- Conservative management along with definitive surgical treatment of the disease form the goals of management of pilonidal disease.
- Pilonidal abscess is treated as an emergency with incision and drainage and followed up at a later date with a definitive treatment.
- Flap procedures are the most effective way to treat the disease.

SUMMARY

- Pilonidal disease is a disease that is not routinely reported.
- Though common in the natal cleft, extra natal sites also have been reported.
- It is an acquired condition due to various predisposing factors.
- It is more common in males compared to the females.
- It affects young adults and is rarely seen after the age of 40 yrs.
- Presentation may vary from asymptomatic pits to chronic pain and discharging sinuses and acute presentations of abscess.
- Patients with an increased body mass index and those with a deep natal cleft are more prone for it.
- Patients who work for prolonged sitting and those close to vibrating machinery are more prone to develop this disease.
- The most common organisms isolated from the pilonidal sinus are anaerobes.
- Though sterile cultures and occasional mixed growth is also noted.
- The main goals of pilonidal treatment are maintaining good

personal hygiene and regular epilation of the local area and a definitive good surgical procedure.

- The main stay for treatment of pilonidal abscess is incision and drainage through a lateral incision away from the mid line.
- This is not a definitive procedure and the rates of recurrence are very high.
- There are a wide variety of treatments both surgical and non-surgical that are advocated in the management of pilonidal disease.
- All treatments have their own advantages and disadvantages with respective complications and recurrence rates.
- Among all, it is the flap procedures which have a low recurrence, less duration of hospital stay and early return to work.
- Marsupialization though has the least recurrence rate, the time taken for healing of the wound is significantly high, amounting to weeks and there is also a delay in returning to daily activities.
- Hence flap techniques-Limberg flap is the most effective surgery to treat pilonidal disease.

ஆராய்ச்சி தகவல் தாள்

தலைப்பு **பைலோநிடல் சைனஸ் (Pilonidal Sinus) என்ற நோய்க்காக செய்யப்படும் பல்வேறு அறுவை சிகிச்சைகளில் எந்த ஒரு அறுவை சிகிச்சை நோயாளிக்கு மிகவும் பயனுள்ளதாகவும், நோயை சிறந்த முறையில் குணப்படுத்துவதாகவும் உள்ளது என்பது பற்றிய ஆய்வு.**

சென்னை இராஜீவ்காந்தி அரசு பொது மருத்துவனையில், குடலில் ஓட்டை ஏற்பட்டு பாதிப்புக்குள்ளாகும் நோயாளிகளின் ஆரோக்கியம் குன்றிய நிலை மற்றும் உயிரிழப்பு முடிவினை தீர்மானிக்கும் காரணிகளை மேன்ஹிம் குடல் சவ்வு அழற்சி அளவீடு கொண்டு முன்னறிவது பற்றிய ஓர் ஆய்வு இங்கு நடைபெறுகிறது.

பைலோநிடல் சைனஸ் (Pilonidal Sinus) என்ற நோய்க்காக செய்யப்படும் பல்வேறு அறுவை சிகிச்சைகளில் எந்த ஒரு அறுவை சிகிச்சை நோயாளிக்கு மிகவும் பயனுள்ளதாகவும், நோயை சிறந்த முறையில் குணப்படுத்துவதாகவும் உள்ளது என்பது பற்றிய ஆய்வு. இதனால் தங்களது நோயின் ஆய்வறிக்கையோ அல்லது சிகிச்சையோ பாதிப்பு ஏற்படாது என்பதையும் தெரிவித்துக்கொள்கிறோம்.

முடிவுகளை அல்லது கருத்துகளை வெளியிடும்போதோ அல்லது ஆராய்ச்சியின் போதோ தங்களது பெயரையோ அல்லது அடையாளங்களையோ வெளியிடமாட்டோம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

இந்த சிறப்பு சிகிச்சையின் முடிவுகளை ஆராய்ச்சியின்போது அல்லது ஆராய்ச்சியின் முடிவின் போது தங்களுக்கு அறிவிக்கப்படும் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில் தான் இருக்கிறது. மேலும் நீங்கள் எந்நேரமும் இந்த ஆராய்ச்சியிலிருந்து பின்வாங்கலாம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

ஆராய்ச்சியாளர் கையொப்பம் பங்கேற்பாளர் கையொப்பம்

நாள் :
இடம் :

ஆராய்ச்சி ஒப்புதல் படிவம்

ஆராய்ச்சி தலைப்பு

பைலோநிடல் சைனஸ் (Pilonidal Sinus) என்ற நோய்க்காக செய்யப்படும் பல்வேறு அறுவை சிகிச்சைகளில் எந்த ஒரு அறுவை சிகிச்சை நோயாளிக்கு மிகவும் பயனுள்ளதாகவும், நோயை சிறந்த முறையில் குணப்படுத்துவதாகவும் உள்ளது என்பது பற்றிய ஆய்வு.

பெயர்	:	தேதி	:
வயது	:	உள் நோயாளி எண்	:
பால்	:	ஆராய்ச்சி சேர்க்கை எண்	:

இந்த ஆராய்ச்சியின் விவரங்களும் அதன் நோக்கமும் முழுமையாக எனக்கு தெளிவாக விளக்கப்பட்டது.

எனக்கு விளக்கப்பட்ட விஷயங்களை புரிந்துகொண்டு நான் எனது சம்மதத்தை தெரிவிக்கிறேன்.

இந்த ஆராய்ச்சியில் பிறரின் நிர்பந்தமின்றி என் சொந்த விருப்பத்தின்பேரில் நான் பங்கு பெறுகின்றேன். இந்த ஆராய்ச்சியில் இருந்து நான் எந்நேரமும் பின் வாங்கலாம் என்பதையும் அதனால் எந்த பாதிப்பும் ஏற்படாது என்பதையும் நான் புரிந்துகொண்டேன்.

இந்த ஆராய்ச்சியினால் ஏற்படும் நன்மைகளையும் சில பக்க விளைவுகளையும் பற்றி தெளிவாக மருத்துவர் மூலம் தெரிந்துகொண்டேன்.

நான் என்னுடைய சுய நினைவுடனும் மற்றும் முழு சுதந்திரத்துடனும் இந்த மருத்துவ ஆராய்ச்சியில் என்னை சேர்த்துக்கொள்ள சம்மதிக்கிறேன்.

ஆராய்ச்சியாளர் கையொப்பம் பங்கேற்பாளர் கையொப்பம்

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ANNEXURE

CASE SHEET PROFORMA

Name — Date of presentation

Age/Sex — Date of admission

Occupation — Date of surgery

M.R. number — Date of diacharge

Chief complaints

Pain

- Mode of onset
- Site of pain
- Duration of pain
- Type of pain
- Character of pain
- Aggravating
- factors Relieving
- factors

Swelling

- Number
- Duration
- Aggravating factors
- Relieving factors

Discharge

- Duration
- Amount
- Foul smelling
- Blood stained

Fever

Difficulty is sitting

Past History

History of similar complaints

Duration

Number of episodes

Mode of intervention

Number of interventions

Other Medical / Surgical

Illnesses

Family History

Personal History

Diet

Appetite

Sleep

Health hazardous habits-

Tobacco

consumption

Alcohol

consumption

Bowel habits

Bladder habits

Obstetric and menstrual history in females

Drug/allergy history

General Physical Examination

Built Nourishment

Height Weight

Body Mass Index

Vital Signs

Pulse Temperature

B.P. Respiratory rate

Cardinal Signs

Pallor Icterus Cyanosis Clubbing Lymphadenopathy

Oedema

Systemic

Examination

Cardio vascular system

Respiratory system

Central nervous system

Musculoskeletal system

Per abdomen

Local Examination

Inspection

Natal cleft

Deep/superficial

Sinus

Number

Site

- Swelling Site
  - Number
  - Size
  - Shape
  - Extent
  - Surface
  - Skin
  - Surrounding area
- Discharge
  - Amount
  - Foul
  - smelling
  - Serous
  - Purulent
  - Associated with hair

Palpation

Local rise of temperature

Tenderness

Induration

Fibrosis

Examination of spine and pelvis

Per rectal

examination

Clinical Diagnosis

Pilonidal sinus

Pilonidal cyst

Pilonidal abscess

Investigations

Routine investigations

Hemoglobin percentage

Total count

Differential count

Erythrocyte sedimentation rate

Bleeding time

Clotting time

Urine for protein, sugar and microscopy

Random blood sugar

Blood urea

Serum

creatinine

H.I.V.

Hbs.Ag.

Specific investigations:

Pus for culture and

sensitivity Chest radiograph

Electrocardiograph

X - ray lateral view of the lumbo – sacral spine

Treatment

- Conservative
  - Personal hygiene
  - Hair epilation
- Abscess-incision and drainage
- Surgery
  - Limberg Flap
  - Marsupilisation
  - Wide excision

Histopathological report

Post Operative period

- Management
- Complications

Follow up

KEY TO MASTER CHART

Sl. No.	:	Serial Number
M	:	Male
F	:	Female
B.D.	:	Bus driver
Agri	:	Agriculturist
G.F.W.	:	Garment factory worker
S.K.	:	Shop keeper
T.D.	:	Taxi driver
A.D.	:	Auto driver
DOHSPO	:	Duration of hospital stay post op
TFH	:	Time taken for healing
P.I.	:	Previous Interventions
B.M.I.	:	Body Mass Index
N.C.	:	Natal Cleft
D	:	Deep
Pus C/S	:	Pus for Culture and Sensitivity
S.A.	:	Staphylococcus aureus
B.F.	:	Bacteroides fragilis
E.C.	:	Escherichia coli
P.M.	:	Proteus mirabilis
N.G.	:	No growth
P.A.	:	Pseudomonas aeroginosa
M.G.	:	Mixed growth
N.R.A.	:	No radiological abnormality
I n D	:	Incision and Drainage
W.E.	:	Wide Excision
Mar.	:	Marsupialization
L.F.	:	Limberg Flap
W.I.	:	Wound Infection
W.D.	:	Wound Dehiscence

MASTER SHEET

Sl. No.	Name	Age	Sex	Occupation	DOH SPO	TFH	Presentation				Examination						Investigations		Treatment				Complications			Follow up
							Swelling	Discharge	Pain	PI	BMI	Swelling	Sinus	Discharge	Absces s	NC	Puc C/S	Xray	IND	WE	Mar	LF	WI	WD	Collection	
1	Suresh	28	M	B D	6days	15days	+	+	+	+	31.2	+	+	+	+	D	SA	NRA	+	-	-	+	+	-	-	
2	Manjunath	22	M	Student	4days	10days	+	+	+	-	28.4	+	+	+	+	D	SA	NRA	+	-	-	+	-	-	-	
3	Shiva	24	M	Tailor	4days	10days	-	-	+	+	26.5	+	+	+	-	D	PA	NRA	-	-	-	+	-	-	-	
4	Palraj	23	M	Agri	4days	10days	+	-	-	+	32.8	+	+	+	-	D	BF	NRA	-	-	-	+	-	-	+	
5	Latha	34	F	G F W	15days	56days	+	-	+	+	23.9	-	+	+	-	D	BF	NRA	-	+	-		+	-	-	Recurrance
6	Shankar	20	M	Student	4days	10days	+	+	+	-	25.9	+	+	+	+	D	EC	NRA	+	-	-	+	-	-	-	
7	Ganesh	26	M	Agri	15days	25days	+	-	-	+	33.4	+	+	+	-	D	P M	NRA	-	-	-	+	+	+	-	Recurrance
8	Savithri	29	F	Tailor	12days	58days	+	-	+	+	31.8	+	+	+	-	D	B F	NRA	-	+	-		-	-	-	
9	Lokesh	32	M	S K	3days	9days	-	-	+	+	33.6	-	+	+	-	D	S A	NRA	-	-	-	+	-	-	-	
10	Eswaran	29	M	Agri	4days	11days	+	-	+	+	28.9	+	+	+	-	D	S A	NRA	-	-	-	+	-	-	-	
11	Murali	27	M	S K	4days	11days	-	-	+	+	29.6	-	+	+	-	D	S A	NRA	-	-	-	+	-	-	+	
12	Ramesh	38	M	T D	3days	9days	+	-	-	+	31.5	+	+	-	-	D	N G	NRA	-	-	-	+	-	-	-	
13	Radha	36	F	G F W	6days	12days	+	-	-	+	32.9	+	+	-	-	D	N G	NRA	-	-	-	+	-	-	+	
14	Kaliyappan	27	M	Agri	18days	35days	+	-	+	+	29.8	+	+	+	-	D	P A	NRA	-	-	+	-	-	-	-	
15	Pandiaraj	25	M	Agri	4days	10days	-	-	+	+	31.1	+	+	+	-	D	B F	NRA	-	-	-	+	-	-	-	

16	Govindan	25	M	S K	4days	10days	+	+	+	+	28.5	+	+	+	+	D	B F	NRA	+	-	-	+	-	-	-	
17	Rakesh	35	M	T D	6days	15days	+	-	+	+	32.2	+	+	+	-	D	B F	NRA	-	-	-	+	+	-	-	
18	Raman	32	M	S K	5days	10days	-	-	+	+	27.6	-	+	+	-	D	S A	NRA	-	-	-	+	-	-	-	
19	Prakasam	31	M	Clerk	23days	34days	+	+	+	+	29.8	+	+	+	+	D	E C	NRA	+	-	+		-	-	-	
20	Raja	25	M	T D	4days	9days	+	-	+	+	26.4	+	+	+	-	D	B F	NRA	-	-	-	+	-	-	-	
21	Narayanan	27	M	A D	3days	9days	+	+	+	+	27.9	+	+	+	+	D	E C	NRA	+	-	-	+	-	-	-	
22	Krishnan	36	M	T D	12days	28days	+	-	+	+	33.4	+	+	+	-	D	P A	NRA	-	-	-	+	+	+	-	
23	Jayalakshmi	28	F	G F W	18days	35days	+	+	+	+	30.6	+	+	+	-	D	P M	NRA	-	+	-		+	-	-	Recurrance
24	Murugan	39	M	A D	4days	10days	-	-	+	+	33.9	-	+	+	-	D	B F	NRA	-	-	-	+	-	-	-	
25	Anandan	38	M	S K	3days	10days	+	-	+	+	31.7	-	+	+	-	D	S A	NRA	-	-	-	+	-	-	-	
26	Jayaraman	26	M	A D	3days	10days	+	+	+	+	30.8	+	+	+	+	D	B F	NRA	+	-	-	+	-	-	-	
27	Thulasi	30	F	Clerk	10days	27days	-	-	+	+	28.6	+	+	+	-	D	S A	NRA	-	-	+		-	-	-	
28	Rangan	31	M	T D	4days	10days	+	+	+	+	30.6	+	+	+	+	D	E C	NRA	+	-	-	+	-	-	-	
29	Thiruna	36	M	A D	5days	11days	-	-	+	+	32.1	+	+	+	-	D	S A	NRA	-	-	-	+	-	-	-	
30	Chandru	27	M	S K	4days	11days	+	+	+	+	26.5	+	+	+	+	D	E C	NRA	+	-	-	+	-	-	-	
31	Prahathi	21	F	Student	13days	29days	+	+	+	-	23.5	+	+	+	+	D	E C	NRA	+	+	-	-	-	-	-	
32	Giri	22	M	Student	4days	11days	+	+	+	-	25.6	+	+	+	+	D	B F	NRA	+	-	-	+	-	-	-	
33	Shivaraman	25	M	Agri	4days	10days	+	-	+	+	29.3	+	+	+	+	D	B F	NRA	+	-	-	+	-	-	-	
34	Ajay	28	M	Tailor	5days	11days	-	-	+	+	30.2	-	+	+	-	D	E C	NRA	-	-	-	+	-	-	-	
35	Kalyanaraman	35	M	B D	4days	10days	+	-	+	+	32.8	+	+	+	-	D	E C	NRA	-	-	-	+	-	-	-	
36	Palraj	29	M	Agri	17days	71days	+	-	+	+	29.7	+	+	+	-	D	S A	NRA	-	+	-		-	-	-	

37	Nagesh	25	M	Agri	3days	10days	+	-	+	+	30.5	+	+	+	-	D	S A	NRA	-	-	-	+	-	-	-	
38	Lalitha	25	F	G F W	13days	35days	+	-	+	+	29.6	+	+	+	-	D	P M	NRA	-	-	+		-	-	-	
39	Kumar	35	M	B D	5days	12days	-	-	+	+	30.4	+	+	+	-	D	B F	NRA	-	-	-	+	-	-	-	
40	Rahmann	36	M	A D	3days	9days	-	-	+	+	32.9	+	+	+	-	D	B F	NRA	-	-	-	+	-	-	-	
41	Sundar	32	M	B D	4days	11days	-	-	+	+	32.4	+	+	+	-	D	P A	NRA	-	-	-	+	-	-	-	
42	Satish	26	M	S K	15days	74days	+	-	+	+	30.7	-	+	+	-	D	E C	NRA	-	+	-		-	-	-	Recurrance
43	Selvam	38	M	A D	4days	11days	-	-	+	+	31.7	+	+	+	-	D	M G	NRA	-	-	-	+	-	-	+	
44	Paranjothi	34	M	B D	3days	10days	+	-	+	+	32.9	-	+	+	-	D	B F	NRA	-	-	-	+	-	-	-	
45	Durairaj	32	M	Agri	3days	10days	-	-	+	+	32.5	+	+	+	-	D	M G	NRA	-	-	-	+	-	-	-	
46	Ahemad Ali	22	M	Student	3days	9days	+	+	+	-	29.8	+	+	+	+	D	P M	NRA	+	-	-	+	-	-	-	
47	Seema	34	F	Tailor	5days	10days	+	-	+	+	31.9	-	+	+	-	D	M G	NRA	-	-	-	+	-	-	-	
48	Gunasekar	31	M	A D	12days	52days	+	-	+	+	32.1	-	+	+	-	D	B F	NRA	-	+	-		-	-	-	
49	Dhanapal	33	M	Agri	4days	9days	+	-	+	+	32.6	+	+	+	-	D	S A	NRA	-	-	-	+	-	-	-	
50	Balakumar	25	M	S K	3days	9days	+	-	+	+	30.5	+	+	+	-	D	S A	NRA	-	-	-	+	-	-	-	